**COURSE LEARNING OUTCOMES:**

COURSE NUMBER & NAME: CST-206 Data Science

LECTURE/LAB HOURS: 2 hours lecture and 2 hours Lab

CREDITS:3 Credits

PREREQUISITES: ENG 097, MAT 144, and CST 161.

COURSE DESCRIPTION: This course aims to provide students with essential data literacy skills by enabling them to comprehend various techniques in data manipulation, visualization, and interpretation. Students will have the opportunity to apply their knowledge using a comprehensive toolkit of software to gain practical experience in data science methods. This course will explore ethical consideration surrounding data privacy, authenticity, and security, while also providing an introductory overview of artificial intelligence.

Upon successful completion of this course, students will be able to:

1. Explore the visualization and implementation of data science algorithms.
2. Understand different subtopics of data science such as machine learning and deep learning.
3. Utilize foundational tools like NumPy, SciPy, and Pandas, demonstrating competence in their application for data manipulation, analysis, and processing.
4. Demonstrate for Data Science objectives.
5. Acquire skills to effectively navigate unstructured data.

**COURSE MATERIALS**:

Foundational Python for Data Science, 1st Edition | copyright 2022

ISBN: 13-9780137605675

Publisher: Pearson

**COURSE REQUIREMENTS:** *(e.g., field trips, lab requirements, technology or special equipment requirements, extra expenses)*

* Internet access to login to Canvas LMS
* USB drive or cloud storage, such as Microsoft OneDrive or Google Drive to save all assignments.
* Jupyter/google colab (Open-Source).

UCNJ Union College of Union County, NJ does not discriminate and prohibits discrimination, as required by state and/or federal law, in all programs and activities, including employment and access to its career and technical programs.

**Experiential Learning:**

Students must complete an experiential learning activity that connects course content to career applications. This activity may be a content specific assignment or practical skill that is applied within a course assignment. This assignment supports the general education learning outcomes of scientific/critical thinking and quantitative reasoning; oral and written communication; and information literacy/technological competency.

**Americans with Disabilities Act (ADA):**

UCNJ Union College of Union County, NJ offers reasonable accommodations and/or services to persons with disabilities. Any student who has a documented disability and wishes to self-identify should contact the Director of Universal Accessibility Services and Veterans Affairs at (908) 709-7164, or email [accessibility@ucc.edu](mailto:accessibility@ucc.edu). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. In order to receive accommodations, students must be registered with Universal Accessibility Services. Students should register with the office as soon as possible. Accommodations are not official until the Faculty Accommodations Alert Form(s) are issued from the student to his/her instructor(s).

**Family Educational Rights and Privacy Act (FERPA):**

The FERPA Statement can be found at <https://www.ucc.edu/admissions/the-family-education-rights-and-privacy-act/>.

UCNJ Mission Statement:  ***Transforming Our Community. . . One Student at a Time***

### Course Grades & Grading Policy:

|  |  |
| --- | --- |
| Evaluation Elements for \*\*\*\* Semester | |
| **Evaluation Element** | **Weight** |
| (3) Exams | 30% |
| (1) Final | 20% |
| Projects | 25% |
| Homework assignments | 20% |
| Class attendance & participation | 5% |

EVALUATION METHODS: *(e.g., exams, essays, quizzes, portfolios)*

CLASS SCHEDULE**:**

|  |  |  |
| --- | --- | --- |
| Week | Unit/Content | Learning Activities |
| 1 | Course Introduction  Review Canvas  Intro to Data Science Overview | Read course syllabus.  Login to Canvas  What is Data Science? |
| 2 | Fundamentals of Python Review  Sequences | Read Chapter I in the book, learning in a Notebook Environment Review, and complete all the assignments described on Canvas |
| 3 & 4 | Sequences  Other Data Structures  Functions | Read Chapter I in the book, learning in a Notebook Environment Review, and complete all the assignments described on Canvas |
| 5 | Exam 1 | Learning in a Notebook Environment |
| 5 & 6 | NumPy | Read Chapter II in the Books, Data Science Libraries, and complete all assignments described on canvas.  Assign Group Project |
| 7 | SciPy | Read Chapter II in the Books, Data Science Libraries, and complete all assignments described on canvas |
| 8 | Pandas  Visualization Libraries | Read Chapter II in the Books, Data Science Libraries, and complete all assignments described on canvas Group Project |
| 8 | Exam 2 | II. Data Science Libraries |
| 8 & 9 | Machine Learning Libraries | Read Chapter II in the Books, Data Science Libraries, and complete all assignments described on canvas |
| 9 & 10 | Natural Language Toolkit | Read Chapter II in the Books, Data Science Libraries, and complete all assignments described on canvas |
| 11 | Exam 3 | II. Data Science Libraries |
| 12 &13 | Functional Programming  Artificial Intelligence | Read Chapter III in the Books, Intermediate Python , and complete all assignments described on canvas  Group Project continuous |
| 13 & 14 | Student Project Present | Read Chapter III in the Books, Intermediate Python , and complete all assignments described on canvas  Group Project Present |
| 15 | Final Exam |  |

SUGGESTED TEACHING METHODOLOGIES: (e.g. group presentations, research paper, lecture)

MAPPING COURSE LEARNING OUTCOMES

to LEARNING ACTIVITIES and EVALUATION METHODS

|  |  |  |
| --- | --- | --- |
| **Course Learning Outcomes (CLOs)** | **Learning Activities** | **Evaluation Methods** |
| Explore the visualization and implementation of data science algorithms. | Engage students in hands-on sessions where they explore and visualize data science algorithms, followed by implementation projects in Python or R, fostering practical understanding and application of algorithmic concepts | Project Assessments.  Algorithm Visualization Analysis.  Written.  Presentation and Discussion.  Peer Review |
| Understand different subtopics of data science such as machine learning and deep learning. | Facilitate student exploration through a lecture series covering various subtopics of data science, including machine learning and deep learning, supplemented by real-world case studies and applications to provide practical insights into the field. | Project Assessments.  Algorithm Visualization Analysis.  Written.  Presentation and Discussion.  Peer/Case Review. |
| Utilize foundational tools like NumPy, SciPy, and Pandas, demonstrating competence in their application for data manipulation, analysis, and processing. | Conduct hands-on workshops and project-based learning activities where students learn to utilize foundational tools like NumPy, SciPy, and Pandas for data manipulation, analysis, and processing tasks, fostering competence through practical application. | Project Assessments.  Algorithm Visualization Analysis.  Written.  Presentation and Discussion.  Peer/Case Review. |
| Demonstrate for Data Science objectives. | Organize a project showcase and case study analysis where students demonstrate their understanding and application of Data Science objectives, showcasing completed projects and analyzing real-world datasets to address specific objectives. | Project Assessments.  Algorithm Visualization Analysis.  Written.  Presentation and Discussion.  Peer/Case Review |
| Acquire skills to effectively navigate unstructured data. | Engage students in text mining exercises and image analysis projects to develop skills in effectively navigating unstructured data, covering tasks such as text preprocessing, sentiment analysis, image preprocessing, object detection, and classification. | Project Assessments.  Algorithm Visualization Analysis.  Written.  Presentation and Discussion.  Peer/Case Review |

*Please note: all programs must integrate in one or more courses, discipline-specific course learning outcomes that reflect the College learning outcomes of scientific/critical thinking and quantitative reasoning, oral/written communication, and information literacy.*

REVISED: June 2022

**Academic Policies:**

**See College Catalog for more information:** [**http://onlinecatalog.ucc.edu/index.php**](http://onlinecatalog.ucc.edu/index.php)