



**FLORIDA INTERNATIONAL UNIVERSITY
UNIVERSITY CURRICULUM COMMITTEE**
Proposal for a Course Change

DO NOT TYPE IN THIS BOX

Bulletin #: 4

Academic Year: 2023-2024

PART I. FILL OUT THIS SECTION COMPLETELY

1. School/College College of Engineering and Computing

Div./Dept. in Which Taught Knight Foundation School of Computing and Information Sciences

2. CAP 4 770 N/A 3
 Alpha 1st Last 3 "C"-lec-lab Cr. Hrs.
 Prefix Digit Digits "L"-Lab

3. Present Course Title Introduction to Data Mining

PART II. FILL OUT CHANGE INFORMATION ONLY

Change Effective 8 / / 2024

4a. New Course Title _____

b. New Abbreviated course Title (for computer class schedules, transcripts)

5a. _____ N/A _____
 New New New Change
 Alpha 1st Last 3 "C"-lec-lab
 Prefix Digit Digits "L"-Lab

LIMITED TO 25 Characters (including spaces)

5b. Change Credit Hours: From _____ To _____

6. New Catalog Description/Major Topics (not to exceed 200 characters including spaces in the box below)
College of Medicine and College of Law: Attach description not exceeding 1,000 characters including spaces.

7. New Prerequisite(s): (STA 3033 or STA 2023 or STA 2122 or STA 4322) and (COP 3530 or COP 3465)

8. New Corequisite(s): None

9. Explain Reclassification Request:

To improve student preparedness in statistics, new statistics prerequisite is added; As this course will be beneficial for Data Science majors, COP3465(a core BS-DS course in Data Structures) is accepted as equivalent to COP 3530, the current corequisite COP 4710 Database Management is no longer essential and is removed from the corequisite

10. Did you attach a copy of the course justification and course syllabus that contains the changes you are requesting? NO YES

11. Does this proposed change impact the assessment process of a program or certificate? If yes, then send notification to assessment@fiu.edu. NO YES

PROPOSAL REQUESTED BY:

Faculty Contact Kaoutar Ben Ahmed

(Type name)

kbenahme@fiu.edu

(Email address)

Chairperson (Dept./Div.) Jason Liu

(Type name)

Chairperson (Curr. Comm.) Alexander Afanasyev

(Type name)

College/School Dean Ines Triay

(Type name)

(Signature)

305-348-7984

(Phone number)

(Signature)

(Signature)

(Signature)

01 / 04 / 2024

01 / 16 / 2024

01 / 17 / 2024

1 / 22 / 2024

Submit one original form. Attach one copy of the course justification and a draft of the course syllabus reflecting any changes requested in this Proposal for a Course Change. The complete syllabus should include all components listed on the Course Change Checklist.

Knight Foundation School of Computing and Information Sciences

Course Title: Introduction to Data Mining

Date: 11/15/2023

Course Number: CAP 4770

Number of Credits: 3

Subject Area: Artificial Intelligence	Subject Area Coordinator: Leonardo Bobadilla Email: bobadilla@cs.fiu.edu
Catalog Description: Data mining applications, data preparation, data reduction and various data mining techniques such as association, clustering, classification, anomaly detection.	
Textbooks: Data Mining: Practical Machine Learning Tools and Techniques (Fourth Edition, 2017) by: Ian H. Witten, Eibe Frank, and Christopher J. Pal. Publisher: Morgan Kaufmann Publishers. ISBN-10: 0128042915	
References: Data Mining: Practical Machine Learning Tools and Techniques (Fourth Edition, 2017) by: Ian H. Witten, Eibe Frank, and Christopher J. Pal. Publisher: Morgan Kaufmann	
Prerequisites Courses: (STA 3033 or STA 2023 or STA 2122 or STA 4322) and (COP 3530 or COP 3465)	
Corequisite Courses: None	

Type: Elective for CS (Applications), Elective for DS (AI-Robotics)

Prerequisites Topics:

1. Basic statistics and probability concepts.
2. Data structures.
3. Programming languages.

Course Outcomes:

1. Apply Data Preprocessing Techniques
2. Implement Data Mining Algorithms
3. Evaluate Predictive Models
4. Discover and Interpret Rules
5. Communicate Data Mining Insights Effectively
6. Practice selecting and applying data mining techniques to the solve real-world problems

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Association between Student Outcomes and Course Outcomes

BS in Computing: Student Outcomes	Course Outcomes
1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	2, 4, 6
2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	2, 4, 6
3) Communicate effectively in a variety of professional contexts.	3, 5
4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	
5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	6
Program Specific Student Outcomes	
6) Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	2, 6
6) Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders' needs. [DS]	1, 2, 3, 4, 6

Assessment Plan for the Course and how Data in the Course are used to assess Student Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:

<https://abet.cis.fiu.edu/>

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Outline

Topic	Number of Lecture Hours	Outcomes
<ul style="list-style-type: none"> • Introduction to Data Mining <ul style="list-style-type: none"> ○ Data mining applications ○ Machine Learning Methods ○ Careers in Data Mining ○ Data Mining Lifecycle ○ Ethics 	3	1
<ul style="list-style-type: none"> • Probability and Statistics Review <ul style="list-style-type: none"> ○ Introduction to Random Variables ○ Normal Distribution ○ Student's t-Distribution 	3	1
<ul style="list-style-type: none"> • Weka & Python for Data Mining <ul style="list-style-type: none"> ○ Weka for machine learning ○ Programming with Python and Jupyter ○ Data Mining Packages 	3	1,2
<ul style="list-style-type: none"> • Data Preprocessing & Visualization <ul style="list-style-type: none"> ○ Data Formats ○ Handling Missing Values ○ Standardization and Normalization ○ Dimensionality Reduction ○ Training, Validation, and Test Sets ○ Outliers ○ Tools for Visualizing Data 	6	1,2
<ul style="list-style-type: none"> • Supervised Learning <ul style="list-style-type: none"> ○ OneR ○ NaiveBayes ○ Decision Trees ○ Regression ○ Perceptrons ○ Classification Rules 	12	2, 3, 4, 5
<ul style="list-style-type: none"> • Association Rules & Market Basket Analysis <ul style="list-style-type: none"> ○ Apriori Algorithm ○ Frequent Pattern Mining 	3	4
<ul style="list-style-type: none"> • Model Evaluation 	3	3
<ul style="list-style-type: none"> • Unsupervised Learning 	3	2, 5
<ul style="list-style-type: none"> • Advanced Topics in Data Mining 	6	6

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Performance Measures for Evaluation

Assignment	Percentage of Final Grade
Homework (5)	15%
Exams (2)	35%
Projects (2)	25%
Final Project	25%

Letter	Range%	Letter	Range%
A	95 or above	C	70 - 76
A-	90 - 94	D	60 - 69
B+	87 - 89	F	59 or less

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Project 2: Market Basket Analysis with Association Rules

Description: Students will explore market basket analysis using association rules on a transactional dataset. They will apply the Apriori algorithm and conduct frequent pattern mining to discover meaningful associations between items. The project will involve preprocessing the data, setting relevant parameters, and interpreting the discovered rules.

Rubric:

Criteria	Excellent (100)	Good (80)	Average (60)	Below Average (40)	Poor (20)
Dataset Selection and Preprocessing (15%)	Chooses a complex, real-world dataset and preprocesses it effectively, addressing all relevant issues.	Selects a meaningful dataset and performs preprocessing with minor issues.	Chooses a dataset but encounters challenges in preprocessing, affecting the quality of the data.	Selects an inappropriate dataset or struggles significantly with preprocessing.	Fails to choose a suitable dataset or skips preprocessing entirely.
Algorithm Implementation (20%)	Implements the Apriori algorithm and frequent pattern mining correctly with well-documented code.	Implements algorithms with minor errors but maintains overall functionality.	Implements algorithms with significant errors impacting functionality.	Struggles to implement algorithms, resulting in poor functionality.	Does not implement the required algorithms.
Association Rule Discovery (25%)	Successfully discovers meaningful association rules with insightful interpretation.	Discovers association rules with adequate interpretation.	Discovers rules with limited analysis or less meaningful interpretations.	Struggles to discover meaningful rules or provides minimal interpretation.	Fails to discover meaningful association rules.
Performance Metrics and Analysis (20%)	Analyzes the performance of association rules effectively, considering support, confidence, and lift.	Analyzes performance with minor oversights or less detailed examination.	Analyzes performance with limited consideration of relevant metrics.	Struggles to analyze performance effectively.	Fails to analyze the performance of association rules.
Code Quality and Readability (20%)	Code is well-structured, well-documented, and follows best practices, making it easy to understand.	Code is mostly well-structured and documented but may lack some clarity.	Code is organized but may lack proper documentation and readability.	Code lacks structure, documentation, and readability, making it challenging to understand.	Code is disorganized and entirely lacking documentation.

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Final Project: Predictive Modeling with Supervised Learning

Description: Students will work on a project involving predictive modeling using supervised learning techniques. They will choose a real-world dataset, preprocess the data, select appropriate features, and apply various supervised learning algorithms such as Decision Trees, Naive Bayes, and Regression. The goal is to build a predictive model and evaluate its performance using relevant metrics.

Rubric:

Criteria	Excellent (100)	Good (80)	Average (60)	Below Average (40)	Poor (20)
Dataset Selection and Preprocessing (15%)	Chooses a complex, real-world dataset and preprocesses it effectively, addressing all relevant issues.	Selects a meaningful dataset and performs preprocessing with minor issues.	Chooses a dataset but encounters challenges in preprocessing, affecting the quality of the data.	Selects an inappropriate dataset or struggles significantly with preprocessing.	Fails to choose a suitable dataset or skips preprocessing entirely.
Algorithm Implementation (20%)	Implements the chosen algorithms correctly with well-documented code.	Implements algorithms with minor errors but maintains overall functionality.	Implements algorithms with significant errors impacting functionality.	Struggles to implement algorithms, resulting in poor functionality.	Does not implement the required algorithms.
Training and Convergence (20%)	Successfully trains the model with optimal hyperparameter tuning, leading to convergence.	Achieves successful training but with suboptimal hyperparameter choices.	Encounters difficulties in training or achieving convergence.	Struggles to train the model, resulting in poor or no convergence.	Fails to train the model.
Performance Metrics and Analysis (25%)	Achieves excellent performance metrics with insightful analysis of the model's strengths and weaknesses.	Achieves good performance metrics with adequate analysis.	Achieves acceptable metrics with limited analysis.	Attains poor metrics with minimal analysis.	Fails to achieve meaningful performance metrics.
Code Quality and Readability (20%)	Code is well-structured, well-documented, and follows best practices, making it easy to understand.	Code is mostly well-structured and documented but may lack some clarity.	Code is organized but may lack proper documentation and readability.	Code lacks structure, documentation, and readability, making it challenging to understand.	Code is disorganized and entirely lacking documentation