DO NOT TYPE IN THIS BOX

Bulletin #: _____

Academic Year: _____

FLORIDA INTERNATIONAL UNIVERSITY
UNIVERSITY CURRICULUM COMMITTEE
Proposal for a Course Change

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

2.

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

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)* _____

LIMITED TO 25 Characters *(including spaces)*

5a.

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

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 w

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) _____ (Signature) 01 / 04 / 2024

kbenahme@fiu.edu (Email address) 305-348-7984 (Phone number)

Chairperson (Dept./Div.) Jason Liu (Type name) _____ (Signature) _____ / _____ / 2024

Chairperson (Curr. Comm.) Alexander Afanasysev (Type name) _____ (Signature) _____ / _____ / 2024

College/School Dean Ines Triay (Type name) _____ (Signature) _____ / _____ / 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.*

Course Change Proposal Guidelines

The following serve as guidelines when reviewing for approval of a Course Change proposal. Please follow each step to assure the completion of this form.

Cover Page (titled): Florida International University Curriculum Committee Proposal for a New Course

1. Review the existing course catalog and course descriptions to determine if the course change proposal is complete and accurate (for course changes).
2. Make sure that the cover page/curricular forms are the **most updated forms** on the Faculty Senate website under "**Curriculum Other Forms".**
3. Note the effective date is specified by the Faculty Senate – University Curriculum Calendar facultysenate.fiu.edu (e.g., bulletin 1-3 is the following fall, bulletin 4-6 is the Spring of the next academic year)
4. All supporting documents should be included (e.g., emails to the assessment office, communication with other departments possibly impacted by this change)

Question 11: Does this proposed change impact the assessment process of a program or certificate? This question refers to the student learning outcomes of a degree program and the specific courses (culminating experiences) used to gather student artifacts to access critical thinking, communication, content knowledge, etc.

5. Insert the justification in front of the attached syllabi, which clearly and accurately describes the rationale for each change made in the course.

Syllabus

1) Be sure that the **syllabus reflects all changes that were requested** on the Course Change form cover page.
2) Required Syllabus Components: (Generic Syllabus not specific to any semester)
   a) Course Prefix and number and full name as published in the catalog or course change form if a description change is requested.
   b) Prerequisites and co-requisites (if any).
   c) Course Description: The description from the Course Change form must be reflected (but does not have to be verbatim). A detailed description is acceptable to provide students with a more specific course overview. If no course description change is requested, it is still important to correctly illustrate the current catalog description in the syllabus (It is confusing to Curriculum Committee reviewers and the Office of the Registrar when the syllabus course description is out of sync with the catalog).
   d) Course Objectives/Learning Outcomes: Review student learning outcomes to ensure that they are written using measurable verbs (e.g., Bloom's Taxonomy). Note the Faculty Senate Curriculum review process includes the determination of the course outcomes reflecting the higher-level learning of a college course (lower division, upper division, graduate).
   e) Required purchases including textbooks (including ISBN), lab supplies, artistic supplies, and professional and ancillary items. If there is no required text, a list of readings should be included to reflect the depth of learning expected of students. Texts/readings should be from valid sources and timely.
   f) Grading standards to be used in calculating final grades.
   g) A tentative outline that includes major topics, anticipated dates of assignments, performances, artistic submissions, and/or examinations.
   h) Performance measures for evaluation in awarding final grades. The major assignments should reflect appropriate rigor for the course level (lower division, upper division, graduate).
   i) Any policies of the instructor and/or department policies that may impact a student's enrollment or final grade.

The following documents can assist with ensuring that the submitted syllabus meets all the requirements:

2020-2021 Faculty Handbook (Pages 33-36)

Syllabi Requirements Policy and Procedures Library - 300.010 Course Syllabi Requirements

Justification for the “COP 4770 Introduction to Data Mining” Course Change

The following three changes are recommended for careful consideration in proposing modifications to the CAP4770 Introduction to Data Mining course:

- Firstly, adding a new statistics prerequisite is proposed to enhance students' preparedness in statistical concepts, thereby fortifying their foundation for comprehending data mining principles.
- Secondly, acknowledging the relevance of the course to Data Science majors, it is suggested that COP 3465, a core BS-DS course in Data Structures, be accepted as equivalent to COP 3530, streamlining the course requirements for students pursuing a Data Science major.
- Lastly, a reassessment of the current corequisite, COP 4710 Database Management, is advocated, with the proposal to remove its status as an essential corequisite, aligning the course structure with the evolving needs and curriculum of the students.

These proposed changes are intended to optimize the course's alignment with contemporary educational objectives and to facilitate a more coherent and efficient learning experience for students.

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 solve real-world problems.

Knight Foundation School of Computing and Information Sciences
CAP 4770 Introduction to Data Mining

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/

Knight Foundation School of Computing and Information Sciences
CAP 4770 Introduction to Data Mining

Outline

Topic	Number of Lecture Hours	Outcomes
• Introduction to Data Mining o Data mining applications o Machine Learning Methods o Careers in Data Mining o Data Mining Lifecycle o Ethics	3	1
• Probability and Statistics Review o Introduction to Random Variables o Normal Distribution o Student's t-Distribution	3	1
• Weka & Python for Data Mining o Weka for machine learning o Programming with Python and Jupyter o Data Mining Packages	3	1,2
• Data Preprocessing & Visualization o Data Formats o Handling Missing Values o Standardization and Normalization o Dimensionality Reduction o Training, Validation, and Test Sets o Outliers o Tools for Visualizing Data	6	1,2
• Supervised Learning o OneR o NaiveBayes o Decision Trees o Regression o Perceptrons o Classification Rules	12	2, 3, 4, 5
• Association Rules & Market Basket Analysis o Apriori Algorithm o Frequent Pattern Mining	3	4
• Model Evaluation	3	3
• Unsupervised Learning	3	2, 5
• Advanced Topics in Data Mining	6	6

Knight Foundation School of Computing and Information Sciences
CAP 4770 Introduction to Data Mining

Performance Measures for Evaluation

Assignment	Total Points	Percentage of Final Grade
Homework (5)	100 each	15%
Exams (2)	100 each	35%
Projects (3)	100 each	25%
Final Project	100	25%
	TOTAL	100%

Letter Grade Distribution Table

Letter	Range%		Letter	Range%		Letter	Range%
A	95 or above		B	83 - 86		C	70 - 76
A-	90 - 94		B-	80 - 82		D	60 - 69
B+	87 - 89		C+	77 - 79		F	59 or less

Knight Foundation School of Computing and Information Sciences
CAP 4770 Introduction to Data Mining

Description of Possible Projects

Project 1: 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

Knight Foundation School of Computing and Information Sciences
CAP 4770 Introduction to Data Mining

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