Miami Dade College

Course Description
CAI2840C | Introduction to Computer Vision | 3.00 credits
Students will learn fundamental concepts in Computer Vision (CV) and image processing, including introduction to necessary proprietary and opensource Python libraries. Prerequisite: CAI2100C and recommended preparation: COP1047C or equivalent knowledge of Python programming language.

Course Competencies:
Competency 1: The students will describe Computer Vision and associated applications by:
1. Defining Computer Vision and the evolution of the field
2. Identifying and listing several applications of Computer Vision
3. Discussing the societal impact of Computer Vision
4. Recognizing and demonstrating the mathematical concepts used for various computer vision applications

Competency 2: The students will describe the data acquisition and exploration processes in Computer Vision by:
1. Analyzing the steps involved in executing a Computer Vision project
2. Distinguishing between types of Computer Vision data, various data sources, and methods involved in acquiring computer vision data
3. Evaluating the ethical considerations during acquiring data for Computer Vision
4. Describing and applying preprocessing methods on several example datasets
5. Balancing an imbalanced dataset
6. Describing and differentiating image segmentation and color segmentation
7. Implementing advanced pre-processing of computer vision datasets

Competency 3: Students will explore Convolutional Neural Networks (CNN) by:
1. Comparing and contrasting the biological visual cortex and CNN
2. Describing and tuning the hyperparameters in CNN
3. Defining and explaining activation functions and their importance
4. Constructing CNN models and differentiating between several CNN layers
5. Distinguishing between popular CNN architectures
6. Explaining the working of transfer learning
7. Exploring and implementing pretrained models

Competency 4: The students will implement Computer Vision projects using proprietary and open-source Python libraries by:
1. Outlining several proprietary and open-source Python library operations and functions
2. Demonstrating the use of proprietary and open-source computer vision applications

Competency 5: The students will explore Generative Adversarial Networks (GANs) by:
1. Explaining the internal working of GANs
2. Identifying several applications of GANs
3. Evaluating the ethical considerations behind using GANs
4. Developing an end-to-end GAN model

Competency 6: The students will explore vendor Computer Vision solutions by:
1. Recognizing vendor specific implementation of the AI project cycle
2. Develop various solutions utilizing vendor pretrained models and toolkits
3. Describing, identifying, and building Edge AI and IoT application and solutions
4. Summarizing and deploying CV models and Edge IoT and AI solutions on vendor clouds

Updated: Fall 2025

Competency 7: The students will explore the future of Computer Vision by:
1. Discussing advancements in the field of Computer Vision
2. Assessing future ethical and computational limitations for Computer Vision application

<u>Learning Outcomes:</u>
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information.
- Demonstrate knowledge of ethical thinking and its application to issues in society
- Use computer and emerging technologies effectively