2110433 COMPUTER VISION	Computer Engineering, Chula 2/2024(2/2567) by **Thanarat H. Chalidabhongse** (Instructor) Thananop **Ton** Kobchaisawad (Guest Lecturer) Korranat **Kao** Naruenatthanaset (TAs)
my CourseVille 2110433 Computer Vision (2024/2)	**Classroom** : #504, Engineering Centennial Memorial Building (อาคารวิศวฯ 100 ปี)

DESCRIPTION: This course will give students a fundamental introduction to the **theory and practice of Computer Vision**. Students will learn from low-level image processing algorithms to high-level pattern recognition, and image understanding concepts. Topics include image formation and representation, basic image processing techniques, feature detection, segmentation, color, texture, object recognition, CNN, 3D vision, and dynamic vision. The class will also introduce students to some applications such as machine vision systems for inspection, biomedical image analysis, biometrics, intelligent vehicle, interactive media, and security and surveillance systems.

PREREQUISITES: None. However, some knowledge about Image Processing, Linear Algebra, Probability and Statistics, Machine Learning, OpenCV, and Python programming experience will be very useful.

REFERENCES:
The following text books are supplemental references but not required:
* *Computer Vision: Algorithms and Applications* by Richard Szeliski, Springer, 2010 (https://szeliski.org/Book/drafts/SzeliskiBook_20100903_draft.pdf)
* *Learning OpenCV3*, by Adrian Kaehler and Gary Bradski, O'Reilly, 2017
* *Deep Learning* by Goodfellow, Bengio, and Courville, MIT Press (https://www.deeplearningbook.org/)

GRADING: Grades will be based on the followings:
* Assignments/Participation   20%
* Exams   40%
* Term Project   40%

TERM PROJECT: Students will be asked to form a team of 4 students. Each team will complete a term project emphasizing on developing a computer vision system using the CDIO process. Scores will be based on creativity, technical quality, written report, oral presentations, and demo.

Class Schedule

WEEK	DATE	LECTURES (IN-CLASS)	LABS (IN-CLASS)	ASSIGNMENTS (Home Work)
1	6 JAN 2024	• Course overview • Introduction to CV	Lab 0 – OpenCV & Python setup	
2	13 JAN 2024	• Image Formation & Representatio	Lab 1 – Start CV Programming	HW1 – Boomerang clone
3	20 JAN 2024	• Image Filtering	Lab 2 – Pixel Manipulation & Image filtering	HW2 – 2.1 Pixel manipulation 2.2 Which filter is the best?
4	27 JAN 2024	• Edge Detection	Lab 3 – Getting edges	HW3 – 3.1 Simple RBC detector 3.2 Card detector
5	03 FEB 2024	• Color	Lab 4 – Play with color & region	HW4 – Color-based face detector
6	10 FEB 2024	• Texture	Lab 5 – Texture	HW5 – Texture segmentation
7	17 FEB 2024	• Feature Extraction& Descriptors	Lab 6 – Hough transform & Feature descriptors **Project presentation #1**	HW6 – Image stitching
8	24 FEB 2024	• Segmentation & Region Processing Feature-base Object Recognition	Lab 7 – Simple object Recognition	HW7 – Coin counting
9	03 MAR 2024	No class (Midterm Exam Week)	-	-
10	**10 MAR 2024**	**Exam#1**	-	-
11	17 MAR 2024	• CNN (Dr.Thananop)	Lab 8 – CNN	HW8 – Chula-Food-50
12	24 MAR 2024	• Object Detection (Dr.Thananop)	Lab 9 – Object Detection	HW9 – Chula-RBC
13	31 MAR 2024	• Computer Vision on the Edge (Dr.Thananop)	Lab10 – Getting to know Jetson Nano **Project presentation #2**	HW10 – Object Detection on Jetson Nano
14	07 APR 2024	No class (หยุดชดเชยวันจักรี)	-	-
15	14 APR 2024	No class (หยุดสงกรานต์)	-	-
16	21 APR 2024	• Dynamic Vision • 3D Vision	Lab 11 – BGS & Optical flow	-
17	**? APR 2024**	**Exam#2**	-	
20	**15 MAY 2024**	**Final Project Presentation & Reflection**		-