Department of Electrical Engineering

College of Engineering

Salahaddin University-Erbil

Subject: Computer Vision

Course Book – *(2023-2024)*

Lecturer's name: Qahhar Muhammad Qadir BSc, MSc, PhD

Academic Year: 2023/2024 (Semester 2)

Course Book

1. Course name	Computer Vision
2. Lecturer in charge	Qahhar Muhammad Qadir
3. Department/ College	Electrical/Engineering
4. Contact	e-mail: qahhar.qadir@su.edu.krd
5. Time (in hours) per week	Theory: 3 Practical: 0
6. Office hours	Sunday: 09-10
7. Course code	
8. Teacher's academic profile	https://academics.su.edu.krd/ qahhar.qadir
9. Keywords	Image Enhancement/Filtering, Pattern Classification, Shape Descriptors, Shape Matching and Similarity, Contour Models, Moving Objects Tracking.
Prerequisites	Image processing, Computer Programming, Simulation and Modeling

10. Course overview:

This module provides an introduction to fundamental principles of computer vision as well as techniques and algorithms used in this area of knowledge. In particular, it focuses on image analysis and processing such as digital image formation and processing as well as visual feature and motion analysis and detection.

11. Course objective:

1. Give students a firm understanding of the theory underlying the processing and interpretation of visual information,

2. Build student ability to apply that understanding to ubiquitous computing and entertainment related problems,

3. Study efficient algorithms in computer vision and their applications,

4. Use a statistical approach to formulating and solving computer vision problems,

5. Apply the Engineering approach to study the vision, i.e. think back from the problem at hand to suitable techniques, rather than to grab the first technique that you may have heard of.

12. Student's obligation

Students are expected to attend classes, do the assignments and submit them by the due date, sit for the exams and do other required tasks given by the instructor. In particular

- Regular attendance is required according to the university rules.
- The use of mobile phone during the class is prohibited.
- Only the students who are officially enrolled can attend the class, guests and children are not admitted.
- Daily participation and conducting assignments are required.

13. Forms of teaching

The teaching strategies practised in this course include regular weekly lectures using PowerPoint slides, videos, simulation and other supporting materials. All materials are shared with students.

14. Assessment scheme

The performance of the participants is assessed in many ways. Daily participation and activities, assignments/projects, critical reading and exams are used to evaluate them in regular basis. Assignments and critical reading tasks are done by the semester week prior the final examination. Exams (both midterms & final) will be scheduled by the examination committee in the department.

Below is the grading scheme of the course:

Midterm	20%
Review Article	15%
Quizzes	05%
Seminar	10%
Final Exam	50%

15. Student learning outcome:

Upon successful completion of this course, students will be able to
1. Identify and implement appropriate solutions to low, mid and high level Computer Vision problems,
2. Represent problems as a mathematical models and apply appropriate optimization techniques to solve those problems,
3. Apply digital image processing operations and explain their operation in terms of the spatial and frequency domain,
4. Recommend appropriate statistical representations of static and dynamic objects and apply these to solve detection, classification and/or tracking problems,
5. Evaluate the performance of visual classification, tracking and retrieval systems and draw conclusions on their efficacy.

16. Course Reading List and References:

■ **Textbook:**
-Richard Szeliski, "Computer Vision: Algorithms and Applications", available online, 2010, Springer.

■ **Recommended:**
-David A. Forsyth and Jean Ponce, "Computer Vision: A Modern Approach", 2nd Edition, 2011, Springer,
-Neeraj Bhargava and Ritu Bhargava , "A Practical Approach for Image Processing & Computer Vision In MATLAB", 2016, CreateSpace Independent Publishing Platform

- Useful references: Internet
- Magazines and review (internet): Shared by the instructor

17. The Topics:	Lecturer's name
- Introduction to computer vision - Image formation - Image processing - Feature detection and matching - Segmentation - Feature-based alignment - Structure from motion - Dense motion estimation - Image stitching - Computational photography - Stereo correspondence	Qahhar
18. Practical Topics (If there is any)	

19. Examinations:

1. Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....?
With their typical answers
For example:
Q: What is the difference between computer graphic and computer vision?

A: As discussed in the class.

20. Extra notes:
None

21. Peer review