

Course Title:	Computer Vision
Course Code:	ENEL808
Descriptor Start Date:	01/01/2022
POINTS:	15.00
LEVEL:	8
PREREQUISITE/S:	ENGE601
COREQUISITE/S:	None
RESTRICTION/S:	None

LEARNING HOURS

Hours may include lectures, tutorials, online forums, laboratories. Refer to your timetable and course information in Canvas for detailed information.

Total learning hours: 150

PRESCRIPTOR

Provides the underlying notation, methods, and algorithms for processing and analysis of digital images and video, and how to apply these technologies in selected real-world scenarios. Subjects are presented in a concise mathematical and algorithmic form, and tutorials and assignments provide support for experimenting with the taught concepts. Considered scenarios are image filtering, stereo vision, motion analysis, image segmentation, 3D shape reconstruction, and object detection and tracking.

LEARNING OUTCOMES

1. Express the concepts and methods of digital image and video recording, including camera properties and calibration (a, b).
2. Demonstrate critical thinking in designing problem solutions for tasks in image processing and analysis, and also in video processing and analysis (a, b, c).
3. Derive solutions for particular computer vision tasks characterised by specifics of image data, lighting conditions, and time frequency of recording (b, c, d).
4. Critically evaluate the performance of computer vision processes using bench mark data, performance measures, and ways to define ground truth (c, e).
5. Examine opportunities of using computer vision as part of complex robotic or automation systems, or for inspection and surveillance (a ,b, i).

Disclaimer: Course descriptors may be amended between teaching periods/semesters

CONTENT

- Course introduction
- Images in spatial and frequency domain
- Local operators
- Smoothing, sharpening, edge detection, corners
- Image segmentation
- Region analysis (area, perimeter, curvature)
- Line and circle detection
- Camera parameters, coordinates, and camera calibration
- Stereo matching
- Optic flow
- Image features
- Feature tracking (particle filter)
- Object detection and tracking (Kalman filter)

Key to Graduate Capabilities Profile

- Engineering knowledge
- Problem analysis
- Design/development of solutions
- Investigation
- Modern tool usage
- The engineer and society
- Environment and sustainability
- Ethics
- Individual and team work
- Communication
- Project management and finance
- Lifelong learning

LEARNING & TEACHING STRATEGIES

Lectures, tutorials (with student presentations), demonstration of current software in the field.

ASSESSMENT PLAN

Assessment Event	Weighting %	Learning Outcomes
Assignment 1	35.00	1-5
Assignment 2	35.00	1-5
Assignment 3	30.00	1-5

Grade Map

MAP1

A+ A A- Pass with Distinction
B+ B B- Pass with Merit
C+ C C- Pass
D Fail

Overall requirement/s to pass the course:

To pass the course, the student needs to gain a minimum grade of C- overall.

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LEARNING RESOURCES

Klette, R. Concise Computer Vision. Springer, London, 2014
Bradski , G. Learning OpenCV: Computer Vision with OpenCV Library. O'Reilley, 2008

For further information, contact: Te Ara Auaha - Faculty of Design & Creative Technologies

Principal Programme: AK1325, Master of Engineering

Related Programme/s: AK1296
AK3566
AK3751
ICE1
INEXCH1
SABRD1

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