**Course Description Form**

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| 1. Course Name:
 |
| Image Processing |
| 1. Course Code:
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| WBM-51-05 |
| 1. Semester / Year:
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| Semester |
| 1. Description Preparation Date:
 |
| 2024-03-19 |
| 1. Available Attendance Forms:
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| presence in the classroom |
| 1. Number of Credit Hours (Total) / Number of Units (Total)
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| 60 Hours / 3 Units |
| 1. Course administrator's name (mention all, if more than one name)
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| Name: Ahmed Oleiwi AbdulridhaEmail: ahmed.o@uowa.edu.iq |
| 1. Course Objectives
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| **Course Objectives** | **This course focuses on image processing and computer vision focuses on studying methods that allow a machine to learn and analyze images and video using geometry and statistical learning. The recent growth of digital imaging technologies, hardware advances, and machine learning models has led to many exciting recent developments in the field of image and video analytics. This course covers a range of topics, starting from the basics of image formation and processing to recent deep learning methods addressing** |
| 1. Teaching and Learning Strategies
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| **Strategy** | 1- recognize the image and understanding of the content and the relationship between the location and color value and sorts images according to these color values from black and white images and ending with natural colors.2-identify the source of the image and representation and formats stagesbefore finishing out as a file in storage unit3- understand the relationship between image points and how to configure entity within the image and demonstrate chromatography interdependence and on-site4-discussed ways to enlarge and reduce the image and application of a set of algorithms necessary5- touched on the various filters that manipulate the values of the points and leave the various changes to the image6- addressed to the frequency domain and the spatial domain and how toapply filters7- operations of the histogram, edge, segmentation, restoration, erosion and dolation, and others. |
| 1. Course Structure
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| **Week**  | **Hours**  | **Required Learning Outcomes**  | **Unit or subject name**  | **Learning method**  | **Evaluation method**  |
| 1  | 4 | Introduction |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly exams |
| 2 | 4 | Human visual system. Sources of Digital Images, Simultaneous contrast. Optical illusions. Image acquisition.  |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly exams |
| 3 | 4 | Image formation model. Image sampling and quantization. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly exams |
| 4 | 4 | Representing digital images. Spatial and intensity resolution. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly exams |
| 5 | 4 | Image file format. Basic relationships between pixels. Distance measures. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 6 | 4 | Distance measures. Point operations. Arithmetic operations Set and logical operations. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 7 | 4 | First mid teams |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 8 | 4 | Set and logical operations. Spatial domain. Processes on spatial domain. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 9 | 4 | Basic intensity transformation functions. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 10 | 4 | Piecewise-linear transformation functions. Histograms. Histogram processing. Histogram equalization. |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 11 | 4 | What is a spatial filter? The mechanics of linear spatial filtering. Correlation and convolution. Smoothing spatial filters (linear and nonlinear). Sharpening spatial filters characteristics Foundation of sharpening filters. Laplacian filter |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 12 | 4 | **Second mid teams**  |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 13 | 4 | **Image Segmentation, Application of image segmentation, Point Detection, Line Detection, Edge detection, Sobel Edge detection, Prewitt Edge detection** |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 14 | 4 | **Image Compression, Image Compression System, Compression type, Huffman Coding, Lossy compression** |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 15 | 4 | **Color Image Processing, Color Models, Converting colors between model**  |  | Lectures presented in PDF format | Daily exams + homework assignments + monthly |
| 1. Course Evaluation
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|  Daily exams with practical and scientific questions. ‏ Participation scores for difficult competition questions among students Establishing grades for environmental duties and the reports assigned to them Semester exams for the curriculum, in addition to the mid-year exam and final exam |
| 1. Learning and Teaching Resources
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| Required textbooks (curricular books, if any) | Digital Image Processing -Gonzales R.C., Woods R.E. 4th ed., 2018. |
| Main references (sources) | - Digital Image Processing using SCILAB, Rohit M. Thanki • Ashish M. Kothari, 2019. - Digital Image Processing Using MATLAB, Gonzalez R.C., Woods R.E., and Eddins S., 3rd ed., 2020. |
| Recommended books and references (scientific journals, reports...) | All reputable scientific journals that are related to the broad concept of mathematical theories and their results |