



# **SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA**

(University established under section 3 of UGC Act 1956)

(Accredited with 'A' Grade by NAAC)



**CURRICULUM FOR FULL TIME**

**BE - ELECTRONICS AND COMMUNICATION ENGINEERING**

**VALUE ADDED COURSE**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**





Department of Electronics and Communication Engineering

**Value Added Course-Skill Development Laboratories (Optional)**

<b>Year</b>	<b>Name of the course</b>
I year	<b>Digital Image Processing</b>
II year	<b>Robotics Using Arduino For Automation</b>
III year	<b>Real-Time Applications using Python</b>



# Digital Image Processing

SYLLABUS (2023-24)								
Course Code		L	T	P	C	IA	EA	TM
Course Name	Digital Image Processing	0	0	3	3	100	-	100
Course Category	Skill Development program	Syllabus Revision				V.1.0		
Pre-requisite	Basic knowledge on programming language							
<b>Course Objectives:</b>								
The course should enable the students								
1. To develop expertise in digital image processing using MATLAB.								
<b>Course Outcomes:</b>								
On completion of the course, the student will be able to								
1. To understand the core concept of digital image processing								
2. Understand image enhancement and restoration techniques								
3. Applying various Ideal filters in the frequency domain and understand the concept of edge detection.								
4. Compose various Morphological operations on binary images and generate their transformed images.								
<b>LIST OF EXPERIMENTS</b>								
1. Simulating and Displaying Binary and Gray Scale Negatives								
2. Implementation of Relationships between Pixels								
3. Image scaling and rotation								
4. Image enhancement by contrast stretching and Histogram equalization								
5. display of bit planes of image								
6. Display of FFT (1-D & 2-D) of an image								
7. Computation of mean, Standard Deviation, Correlation coefficient of the given Image								
8. Implementation of Image Smoothing Filters (Mean and Median filtering of an Image)								
9. Implementation of image sharpening filters and Edge Detection using Gradient Filters								
10. Implementation of Image Intensity slicing technique for image enhancement								
11. Canny edge detection Algorithm								
12. Image flip and mirror								
13. Mini Project								
						<b>Total Hours</b>	<b>45 Hours</b>	
<b>Text Book(s)</b>								
1.	R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education, 2008							
2.	Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 2nd edition, 2004							
<b>Reference Book(s)</b>								
1.	R.C. Gonzalez and R.E. Woods, Digital Image Processing using Matlab, Second Edition, Pearson Education, 2011							



**ROBOTICS USING ARDUINO FOR AUTOMATION**

SYLLABUS								
Course Code		L	T	P	C	IA	EA	TM
Course Name	<b>ROBOTICS USING ARDUINO FOR AUTOMATION</b>	0	0	3	3			
Course Category	VALUE ADDED COURSE	<b>Syllabus Revision</b>				V.1.0		
Pre-requisite	Basic knowledge of Electronics and Computer programming							
<b>Course Objectives:</b>								
The course should enable the students								
<ol style="list-style-type: none"> <li>1. To develop expertise in embedded programming using Arduino microcontroller.</li> </ol>								
<b>Course Outcomes:</b>								
On completion of the course, the student will be able to								
<ol style="list-style-type: none"> <li>1. Learn embedded programming from the beginner to expert level.</li> <li>2. Learn to use Liquid Crystal Display screens with Arduino.</li> <li>3. Understand the definition and significance of the Robotics.</li> <li>4. Opens up the gateways of innovation and creativity.</li> <li>5. Recognize the factors that contribute to the emergence of Robotics.</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<ol style="list-style-type: none"> <li>1. Prototyping Basics <ol style="list-style-type: none"> <li>a) Fundamentals of Electronics.</li> <li>b) Essential Tools: Breadboard and jumper wires etc.</li> <li>c) Introduction to Microcontroller.</li> <li>d) Introduction to Embedded Systems about Arduino Uno Board.</li> </ol> </li> </ol>								
<ol style="list-style-type: none"> <li>2. Programming Basics <ol style="list-style-type: none"> <li>a) Getting Started with Arduino IDE.</li> <li>b) Basics of 'C' Programming.</li> <li>c) Data Type.</li> </ol> </li> </ol>								
<ol style="list-style-type: none"> <li>3. Digital Operations in Arduino <ol style="list-style-type: none"> <li>a) Control LED indications.</li> <li>b) Controls relay output.</li> </ol> </li> </ol>								
<ol style="list-style-type: none"> <li>4. Analog Operations in Arduino <ol style="list-style-type: none"> <li>a) Temperature measurement.</li> <li>b) Distance measurement.</li> </ol> </li> </ol>								
<ol style="list-style-type: none"> <li>5. Motor Driver operations with Arduino <ol style="list-style-type: none"> <li>a) Motor driver to control DC motor.</li> <li>b) Control the direction of the spin of Servo motor.</li> </ol> </li> </ol>								
<ol style="list-style-type: none"> <li>6. Display operations with Arduino <ol style="list-style-type: none"> <li>a) Using Liquid Crystal Display.</li> <li>b) Using Light Emitting Diode Matrix.</li> </ol> </li> </ol>								

7. Design of water management system for automation using Arduino.	
a) Water level indication.	
b) Automatic Turn ON/OFF pump motor.	
<b>Total Hours</b>	<b>30 Hours</b>
<b>Text Book(s)</b>	
1.	Brian W. Evans “Arduino Programming Notebook” Second Edition, September 2008,
2.	Mark Geddes “Arduino Project Handbook 25 practical projects to get you started” William Pollock publisher, 2019.
<b>Reference Book(s)</b>	
1.	<a href="http://www.arduino.cc">http://www.arduino.cc</a>
2.	<a href="http://www.wiring.org.co">http://www.wiring.org.co</a>
3.	<a href="http://www.arduino.cc/en/Booklet/HomePage">http://www.arduino.cc/en/Booklet/HomePage</a>
4.	<a href="http://cslibrary.stanford.edu/101/">http://cslibrary.stanford.edu/101/</a>



**Real-Time Applications using Python**



Course Code		L	T	P	C	IA	EA	TM	
Course Name	<b>Real-Time Applications using Python</b>	1	0	1	2	100	-	100	
Course Category	Value Added Course	<b>Syllabus Revision</b>					V.1.0		
Pre-requisite	Basic Programming Knowledge								
<b>Course Objectives:</b>									
The course should enable the students									
<ol style="list-style-type: none"> <li>1. To know basic data engineering concepts and supporting libraries in Python</li> <li>2. To understand various image processing techniques</li> <li>3. To integrate hardware and software components using python</li> <li>4. To understand basic classification algorithms and their implementation</li> <li>5. To improve the employability skills of engineering students.</li> </ol>									
<b>Course Outcomes:</b>									
On completion of the course, the student will be able to									
<ol style="list-style-type: none"> <li>1. Apply data engineering concepts to prepare the data for analysis</li> <li>2. Explore various image processing techniques</li> <li>3. Integrate hardware and software components using python</li> <li>4. Implement basic classification, algorithmic models</li> <li>5. Develop their employability skills.</li> </ol>									
<b>Experiments</b>									
1.	Introduction to Python <ul style="list-style-type: none"> <li>➤ Python Libraries</li> <li>➤ Basic programming -Image Processing</li> </ul>								
2.	Cryptography <ul style="list-style-type: none"> <li>➤ Encode and Decoding</li> </ul>								
3.	GUI Implementation <ul style="list-style-type: none"> <li>➤ Alarm Clock</li> </ul>								
4.	Hardware Interfacing (Using Kit: Arduino) <ul style="list-style-type: none"> <li>➤ Switching of LED</li> </ul>								

5.	Detection of Electrical Faults ➤ KNN
6	Heart rate Classification ➤ Decision Tree Classifier
7	Earth Quake Prediction ➤ Random Forest Classifier
8	Hardware Interfacing (Using Kit: Raspberry Pi)
<b>Tools</b>	
1	Python 3.10
2	Anaconda Environment
3	Arduino Board
4	Raspberry-Pi Kit
5	Computer with a powerful CPU/GPU, a minimum of 8GB of RAM, and large storage capacity.
<b>Reference Book:</b>	
1.	Jake Vander Plas, "Python Data Science Handbook", O'Reilly, 2016
2.	Andreas C. Muller, "Introduction to Machine learning with Python", O'Reilly, 2016
3.	John Paul Mueuller, Luca Massaron, "Python for Data Science for Dummies", Wiley,2019
4.	Samir Madhavan, "Mastering Python for Data Science", 2015