

NEW SYLLABUS:

Course Code	18CSE357T	Course Name	BIOMETRICS	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering	Computer science		Data Book / Codes/Standards	Nil	

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		Learning			Program Learning Outcomes (PLO)																
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3		
CL O-1 :	Acquire the knowledge on various biometric traits (<i>Define the basics of Biometric traits</i>)	1	80	85	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
CL O-2 :	Acquire the ability to identify pattern recognition system and its features (<i>Analyze the various pattern recognition system and its features</i>)	1	75	80		H		M			-	-	-	-	-	-	-	-	-		
CL O-3 :	Understand the basic ideas about physical and hehaviourial biometric traits . (1	85	80	H	-		M	-	-	-	-	-	-	-	-	-	-	-		
CL O-4 :	Apply the knowledge of biometrics on developing identification system.	2	80	75		-	H	-	-				M	-	-	-	-	-	-		
CL O-5 :	Apply the knowledge for designing biometric systems(<i>Develop a Design for biometric systems</i>)	3	75	85			H		-	-	-	-	M	-	-	-	-	-	-		
CL O-6 :	Utilize the knowledge on authentication systems for real time security applications (<i>Incorporate the knowledge on developing authentication systems for real world</i>)	4	80	85	-	-	H	-	-	-	M		L	-	-	-	-	-	-		

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Note: Modified content in red is the corrected CLO .

Existing Course Outcome	Course Outcome as per AICTE Exam Reforms
CO1: Acquire the knowledge on various biometric traits	Define the basics of various biometric traits
CO2: Acquire the ability to identify pattern recognition system and its features	Analyse the various pattern recognition system and its features
CO3: Understand the basic ideas about physical and behavioural biometric traits	Demonstrate the basic ideas of physical and behavioural biometric traits
CO4: Apply the knowledge of biometrics on developing identification system.	Apply the knowledge of biometrics on developing identification system (no change)
CO5: Apply the knowledge for designing biometric systems	Develop the design for biometric system
CO6: Acquire the knowledge on authentication systems for real time security applications	Incorporate the knowledge on developing authentication systems for real world security applications

Duration (hour)		9	9	9	9	9
S-1	SLO-1	Introduction of biometric systems	Biometrics Sensors and Data Acquisition	Introduction to multibiometrics	Biometric system authentication	Biometric Authentication Applications
	SLO-2	Biometric functionalities: verification, identification	Biometric data acquisition and database	Sources of multiple evidence	physiological and behavioral properties of biometric system,	access control like a lock or an airport check-in area
S-2	SLO-1	The design cycle of biometric systems	Biometrics Pre-processing	Acquisition sequence	Software biometrics systems	immigration and naturalization
	SLO-2	Building blocks of a generic biometric system	The related biometrics preprocessing technologies	Processing sequence	Hardware biometrics systems	welfare distribution
S-	SLO-1	Introduction to unimodal	Image restoration	Fusion level	Security of biometric systems	military application

3		<i>system</i>				
	SLO-2	<i>Introduction to Multimodal biometric system</i>	<i>Image segmentation</i>	<i>Sensor level fusion</i>	<i>Advisory, insider, infrastructure attacks</i>	<i>banking, e.g., check cashing, credit card, ATM</i>
S-4	SLO-1	<i>Biometric system errors</i>	<i>Pattern extraction and classification</i>	<i>Feature level fusion</i>	<i>Attacks at the user interface</i>	<i>computer login; intruder detection; smart card</i>
	SLO-2	<i>Performance measures</i>	<i>Pattern classification</i>	<i>Score level fusion</i>	<i>impersonation, obfuscation, spoofing</i>	<i>multi-media Communication; WWW and an electronic purse</i>
S-5	SLO-1	<i>Image processing basics</i>	<i>Fingerprint Recognition and acquisition</i>	<i>Rank level fusion</i>	<i>Attacks on biometric processing</i>	<i>sensor fusion; decision fusion</i>
	SLO-2	<i>what is image, acquisition, type, point operations, Geometric transformations</i>	<i>Fingerprint features, matching and synthesis</i>	<i>Decision level fusion</i>	<i>Attacks on system module and interconnections</i>	<i>categorization: e.g., age and gender</i>
S-6	SLO-1	<i>First and second derivative</i>	<i>Face recognition and acquisition</i>	<i>Features Matching and Decision Making</i>	<i>Counter measure: Biometric template security</i>	<i>industrial automation</i>
	SLO-2	<i>steps in edge detection, smoothening, enhancement,</i>	<i>Face detection, feature extraction</i>	<i>Feature matching: null and alternative</i>	<i>Countermeasure: spoof detection</i>	<i>gesture interpretation;</i>

		<i>thresholding, localization,</i>	<i>And matching</i>	<i>Hypothesis h_0, h_1, Error type I/II, Matching score distribution, FM/FNM, ROC curve, DET curve, FAR/FRR curve.</i>		
S-7	SLO-1	<i>Robert's method, Sobel's method, Perwitts</i>	<i>Iris recognition and acquisition</i>	<i>Introduction to Various matching methods:</i>	<i>Challenges in biometric systems like fool proofing, falsepositives</i>	<i>efficient enrollment</i>
	SLO-2	<i>Laplacian of Gaussian, Zero crossing</i>	<i>Iris Segmentati on, normalization and matching</i>	<i>LDA</i>	<i>Developing Tools for Comparing fingerprints</i>	<i>audio-visual tracking</i>
S-8	SLO-1	<i>Low level feature extraction, Describing image motion</i>	<i>Ear recognition</i>	<i>PCA, Eigen vectors and values, 2D- PCA,</i>	<i>Enhancing pattern when data is minimum</i>	<i>stock market;</i>
	SLO-2	<i>High level feature extraction ,Template matching</i>	<i>Ear detection</i>	<i>generalization to p-dim, covariance and correlation, algebra of PCA, projection of data</i>	<i>Biometric failures in special cases like(too much moisture in hands which system can't read)</i>	<i>on-line shopping</i>
S-9	SLO-1	<i>Hough transform for lines</i>	<i>Hand geometry features</i>	<i>Introduction to decision theory and their examples</i>	<i>Mini project: Fingerprint, Face detection</i>	<i>compact embedded systems</i>
		<i>Hough</i>				<i>other</i>

	SLO-2	<i>transform for circles and ellipses</i>	<i>palmpoint features</i>	<i>Explanation – examples</i>	<i>Mini project:signature ,iris detection</i>	<i>commercialize d services</i>
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Learning Resources	<p>1. James wayman, Anilk. Jain, Arun A. Ross, Karthik Nandakumar, —Introduction to. Biometrics, Springer, 2011</p> <p>2. Mark S. Nixon, Alberto S. Aguado, Feature Extraction and image processing for computer vision, Third Edition, Elsevier 2012</p> <p>3. Digital Image Processing using MATLAB, By: Rafael C. Gonzalez, Richard Eugene Woods, 2nd Edition, Tata McGraw-Hill Education 2010</p>	<p>4. Guide to Biometrics, By: Ruud M. Bolle, Sharath Pankanti, Nalini K. Ratha, Andrew W. Senior, Jonathan H. Connell, Springer 2009</p> <p>5. Pattern Classification, By: Richard O. Duda, David G. Stork, Peter E. Hart, Wiley 2007</p> <p>6. Shimon K. Modi, —Biometrics in Identity Management : concepts to applications, Artech House 2011</p>
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Learning Assessment											
	Bloom’sLevel of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theor y	Practic e	Theor y	Practic e	Theor y	Practic e	Theor y	Practic e	Theor y	Practic e
Level 1	Remember	20 %	-	20 %	-	20 %	-	20 %	-	20%	-
	Understand										
Level 2	Apply	20 %	-	20 %	-	20 %	-	20 %	-	20%	-
	Analyze										
Level 3	Evaluate	60 %	-	60 %	-	60 %	-	60 %	-	60%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
<p>1. <i>Raghuraghavendra s,</i> <i>Chief Executive Officer at</i> <i>Forensic & Biometric</i> <i>Investigation Services FBIS</i> <i>Chennai, Tamil Nadu, India</i> <i>Chennai Area, India</i></p>	<p>1. <i>Dr. J.DhaliaSweetlin</i> <i>Designation:Assistant Professor [Sr</i> <i>Grade]Madras Institute of</i> <i>Technology,</i> <i>MIT Road, RadhaNagar,Chromepet,</i> <i>Chennai,Tamil Nadu 600044,</i> <i>India.Email:jdsweetlin@mitindia.edu</i> <i>Area of Specialization: Image</i> <i>Processing, Soft Computing</i></p>	<p>1. <i>Dr. C. Malathy,</i> <i>SRMIST</i></p>
		<p>2. <i>M.Gayathri,</i> <i>SRMIST</i></p> <p>3.<i>Ms.Meenakshi/IT</i> <i>Dept,SRMIST</i></p>