

- Final Exam

**Mapping of COs to Assessment Rubrics :**

	<b>Internal Exam</b>	<b>Assignment</b>	<b>Lab Assessment</b>	<b>End Semester Examinations</b>
CO 1	✓		✓	✓
CO 2	✓		✓	✓
CO 3	✓	✓	✓	✓
CO 4	✓	✓	✓	✓

**4. INTRODUCTION TO BIOMETRIC SYSTEMS**

Discipline	<b>COMPUTER SCIENCE</b>				
Course Code	UK2DSCCSC103				
Course Title	INTRODUCTION TO BIOMETRIC SYSTEMS				
Type of Course	DSC				
Semester	II				
Academic Level	1				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4 hours
Pre-requisites	Basic knowledge about digital images is preferred.				
Course Summary	This course provides an introduction to various biometrics systems. It also helps to study physiological or behavioural characteristics or both, that can be utilised to verify the identity of individuals.				

**Detailed Syllabus:**

Module	Unit	Content	Hrs (L)
I	<b>Introduction to Biometrics</b>		<b>12</b>
	1	<b>INTRODUCTION;</b> Person Recognition; <b>Biometric Systems:</b> Enrolment and recognition phases, Sensor module, Feature extraction module, Database module, Matching module; Biometric Functionalities: Verification, Identification, <b>Biometric System Errors:</b> Performance measures	
	2	<b>The Design Cycle of Biometric Systems:</b> Nature of the application, Choice of biometric trait, Data collection, Choice of features and matching algorithm, Evaluation; Applications of Biometric Systems	
II	<b>Fingerprint Recognition</b>		<b>12</b>
	3	Introduction; <b>Friction Ridge Pattern:</b> Features, Formation; <b>Fingerprint Acquisition:</b> Sensing techniques, Image quality; <b>Feature Extraction:</b> Ridge orientation and frequency estimation, Singularity extraction, Ridge extraction, Minutiae extraction; <b>Matching:</b> Alignment, Pairing minutiae, Match score generation, Fingerprint individuality, Performance evaluation; Fingerprint Indexing, <b>Palmprint:</b> Palmprint features,	
III	<b>Face and Iris Recognition</b>		<b>12</b>
	4	<b>Face Recognition:</b> Introduction- Psychology of face recognition, Facial features, Design of a face recognition system; <b>Image Acquisition:</b> 2D Sensors, 3D Sensors, Video sequences; <b>Face Detection:</b> Viola-Jones face detector; <b>Feature Extraction and Matching:</b> Appearance-based face recognition, Model-based face recognition, Texture-based face recognition, Performance evaluation	
	5	<b>Iris Recognition:</b> Introduction; Design of an Iris Recognition System; Image Acquisition; Iris Segmentation; Generating iris masks; Iris Normalization; Iris Encoding and Matching	
IV	<b>Additional Biometric Traits</b>		<b>12</b>
	6	Introduction; <b>Ear:</b> Ear detection, Ear recognition, Challenges in ear recognition; <b>Gait:</b> Feature extraction and matching, Challenges in gait recognition; <b>Hand Geometry:</b> Image capture, Hand segmentation, Feature Extraction, Feature matching, Challenges in hand geometry recognition; <b>Soft Biometrics:</b> Periocular, Facemarks, Tattoo	
V		<b>Flexi Module: Not included for End Semester Exams</b>	<b>12</b>

	7	Citizen-Facing Applications: Citizen Identification, Criminal Identification, Surveillance; Employee Facing applications: PC/ Network Access; Customer facing applications: Retail/ ATM/ Point of Sale	
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### Reference Books

- 1.
2. Anil K. Jain, Patrick Flynn, and Arun Ross, "Introduction to Biometrics", 2011
3. John D. Woodward Jr., Nicholas M. Orlans, and Peter T. Higgins "Biometrics"
4. Biometrics Identity Verification in a Networked World by Sanir Nanavati, Michael Thieme, 2003, Wiley Computer Publishing Ltd, New Delhi.
5. John Vacca, Biometric Technologies and Verification Systems, 2007

### Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO1	Restate the basic characteristics of Biometrics systems.	U	PSO 1
CO2	Illustrate the role of fingerprint recognition in Biometrics	Ap	PSO 1
CO3	Summarize about face and iris recognition systems	U	PSO 1
CO4	Outline the role of additional traits in biometrics system	U	PSO 1

**R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create**

*Note: 1 or 2 COs/module*

**Name of the Course: INTRODUCTION TO BIOMETRIC SYSTEMS**

**Credits: 4:0:0 (Lecture: Tutorial: Practical)**

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)

CO1	Restate the basic characteristics of Biometrics systems.	PO-5, 6,7 PSO- 1	U	F, C, P	L	-
CO2	Illustrate the role of fingerprint recognition in Biometrics	PO- 6, 7 PSO-1	Ap	F, C, P	L	-
CO3	Summarise about face and iris recognition systems	PO- 6, 7 PSO-1	U	F, C, P	L	-
CO4	Outline the role of additional traits in biometrics system	PO-5, 6, 7 PSO-1	U	F, C, P	L	-

**F-Factual, C- Conceptual, P-Procedural, M-Metacognitive**

**Mapping of COs with PSOs and POs :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO 1</b>	-	-	-	-	2	1	3	-	2	-	-	-
<b>CO 2</b>	-	-	-	-	-	1	3	-	2	-	-	-
<b>CO 3</b>	-	-	-	-	-	1	3	-	2	-	-	-
<b>CO 4</b>	-	-	-	-	2	1	3	-	2	-	-	-

**Correlation Levels:**

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

### Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Lab Assignments
- Final Exam

### Mapping of COs to Assessment Rubrics :

	Internal Exam	Quiz/ Seminar	Assignment	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓		✓	✓
CO 3	✓		✓	✓
CO 4	✓	✓		✓

## 5. E-COMMERCE

Discipline	COMPUTER SCIENCE
Course Code	UK2DSCCSC104
Course Title	E-COMMERCE
Type of Course	DSC