Subject Description Form

Subject Code	COMP435
Subject Title	Biometrics and Security
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: COMP207 (for 61025)/ COMP211, COMP319 Co-requisite/Exclusion: Nil
Objectives	- To understand the problems with current security systems. - To introduce biometric computing knowledge and methods. - To learn some basic biometrics systems based on the learned techniques.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) understand fundamental problems with current biometric systems; (b) recognize physical and behavior biometric characteristics; (c) apply biometric technology into two applications: security and diagnosis; (d) learn some useful biometric techniques to solve the current problems; *Attributes for all-roundedness* (e) communicate effectively with project presentation and technical reports; (f) learn independently for problem solving and solution seeking for biometrics applications. **Alignment of Programme Outcomes:** Programme Outcome 1: This subject contributes to having students practice their writing skills with project document and report writing, as well as project presentation. Programme Outcome 2: This subject contributes to developing a global outlook at various factors that affects the performance and function of a computing system Programme Outcome 4: This subject contributes to developing student critical thinking through tutorial and lab exercises on solving problems. They will also practice more in written assignments, programming exercises, and project.

	Programme Outcome 5: This subject contributes to problem solving with programming skills through lab exercise and project with proper design and implementation. Programme Outcome 7: This subject contributes to team work with group-based project for students to practice team spirit.
Subject Synopsis/ Indicative Syllabus	<table><tr><th>Topic</th></tr><tr><td>**1. Introduction to biometrics and authentication** Why biometrics? What about biometrics? How to design biometric systems? Biometrics definitions and notations; biometric applications; information security; security technologies and systems; authentication.</td></tr><tr><td>**2. Fundamental techniques** Biometrics data acquisition and biometrics database; the related image processing and pattern recognition technologies, including digital image and signal representation, pattern extraction and classification; basic PCA/LDA approaches of automated biometrics identification and verification.</td></tr><tr><td>**3. Typical physical biometrics** Basic physical characteristics of biometrics; some basic introduction of physical biometrics systems (such as fingerprint, palm-print, finger, hand, face, iris, and face, as well as tongue, etc.).</td></tr><tr><td>**4. Typical behavial biometrics** Basic behavioral characteristics of biometrics; some basic introduction of behavioral biometrics systems (such as voice, signature, and gesture recognition, as well as pulse, etc.).</td></tr><tr><td>**5. Multi-biometrics and applications** Security application: Internet/Intranet; e-commerce; banking services; immigration and naturalization service; computer systems; physical access; telephone systems; time, attendance and monitoring. Diagnosis application: tongue diagnosis and pulse diagnosis.</td></tr></table> **Case Study:** Security and diagnosis applications using biometrics authentication technologies.
Teaching/Learning Methodology	The course material will be delivered as a combination of lectures, tutorials and small group project. Students will get familiarized with biometric system and applications, and especially the underlying common technology that enables the biometric systems, e.g, image analysis, machine learning.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
			a	b	c	d	e	f
	1. Assignments	40%	✓	✓	✓	✓	✓	✓
	2. Lab exercises							
	3. Project	20%	✓		✓	✓	✓	✓
	4. Mid-term							
	5. Examination	40%	✓	✓				✓
	Total	100 %						

Student Study Effort Expected	Class contact:	
	▪ Lecture	39 Hrs.
	▪ Tutorial	0 Hrs.
	Other student study effort:	
	▪ Homework	17 Hrs.
	▪ Project	17 Hrs.
	Total student study effort	73 Hrs.

Reading List and References

Reference Books:

1. Zhang, D., *Automated Biometrics: Technologies & Systems*, Kluwer Publisher, 2000.
2. Zhang, D., (Ed.), *Biometric Solutions for Authentication in an e-World*, Kluwer Publisher, 2002.
3. Stallings, W. *Cryptography and Network Security: Principles and Practice*, Third Edition, Prentice Hall, 2003.
4. Jain, et al. (Eds.), *Biometrics: Personal Identification in Networked Society*, Kluwer Publisher, 1999.
5. Sid-Ahmed, M.A., *Image Processing, Theory, Algorithms, & Architectures*, McGraw-Hill, 1995.
6. Awcock. G.W., et al., *Applied Image Processing*, McGraw-Hill, 1996.
7. Abrams, M.D., Jajodia, S., and Podell, H.J., *Information Security: An Integrated Collection of Essays*, IEEE Computer Society Press, 1994.
8. Derek Atkins, et al., *Internet Security Professional Reference*, Second Edition. New Riders Publishing, 1997.
9. Russell, D., *Computer Security Basics*, O'Reilly & Associates, 1991.
10. Zhang, D., *Palmprint Authentication*, Kluwer Academic Publishers, USA, 2004.
11. Zhang, D. and Jain, A.K. (Eds.), *Proc. First International Conference on Biometric Authentication (ICBA)*, 800pp, Springer Verlag, LNCS 3072, 2004
12. Zhang, D., Jing, X. and Yang, Y., *Biometric Images Discrimination (BID) Technologies*, IRM Press, USA, 2005.
13. Zhang, D. and Jain, A.K. (Eds.), *Advances in Biometrics*, International Conference

	- ICB2006, Springer Verlag, LNCS 3832, 2006. 14. IEEE Transaction on Pattern Analysis and Machine Intelligence. 15. IEEE Transaction on Image Processing.