

<b>Short Title:</b>	Biometrics <b>APPROVED</b>
<b>Full Title:</b>	Biometrics
<b>Module Code:</b>	MACS H6016
<b>ECTS credits:</b>	10
<b>NFQ Level:</b>	9
<b>Module Delivered in</b>	<a href="#">2 programme(s)</a>
<b>Module Contributor:</b>	Arnold Hensman
<b>Module Description:</b>	<p>Module aims include: • Cover a broad range of approaches to biometrics reflecting both fundamental principles and the current state-of-the-art. • To develop an understanding of the fundamental components common to all biometric systems. • To develop the student's ability to design, implement, test and evaluate biometric systems that conform to international standards. • To develop the students ability to carry out research in biometrics.</p>
<b>Learning Outcomes:</b>	
<i>On successful completion of this module the learner will be able to</i>	
<ol style="list-style-type: none"> <li>1. Demonstrate knowledge and understanding of the generic components of a biometric system.</li> <li>2. Analyse pattern recognition and feature extraction using face recognition and associated tools</li> <li>3. Research ethical and legal issues associated with the use of biometric systems</li> <li>4. Test, evaluate and deploy biometric systems</li> </ol>	

**Module Content & Assessment**

<b>Indicative Content</b>
<b>Biometric systems technology and performance</b> Function and applications of biometrics. Technologies: face, voice, DNA, iris, retinal scan, finger print, palm print, hand and finger geometry, thermogram, behaviometrics. Advantages and disadvantages of each biometric with respect to system requirements.
<b>Generic components of biometric systems</b> Sensor module, feature extraction, matcher module and system database. Signal and image acquisition and processing. Enrolment and template creation.
<b>Feature extraction and pattern recognition</b> Digital signal processing algorithms for feature extraction. The fast Fourier transform and digital filters. Principal component analysis. Linear discriminant analysis. Distance metrics.
<b>Testing and Evaluation</b> Performance criteria; false match rates and false non-match rates. Probability distributions and selecting thresholds. Receiver operating characteristic curves. Specifications, limitations and weaknesses of biometric systems. Attacks on biometric systems.
<b>Case studies</b> Case studies of design, implementation, testing and evaluation of voice and face recognition systems. Feature extraction for voice and face recognition. Distinctive properties of voice signals and facial images. Factors affecting performance.
<b>Ethics and standards</b> Ethics and privacy in biometrics. The European personal data directive and national laws. Biometrics and US constitutional law.

<b>Indicative Assessment Breakdown</b>	<b>%</b>
Course Work Assessment %	50.00%
Final Exam Assessment %	50.00%

<b>Course Work Assessment %</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Lab work	Analyse biometrics systems	1,2,4	30.00	Every Second Week
Written Report	Research ethical and legal issues with biometrics	3	20.00	Week 6

<b>Final Exam Assessment %</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	n/a	None	50.00	End-of-Semester

<b>Indicative Reassessment Requirement</b>
<b>Repeat examination</b> <i>Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.</i>

**ITB reserves the right to alter the nature and timings of assessment**

**Indicative Module Workload & Resources**

Indicative Workload: Full Time	
Frequency	Indicative Average Weekly Learner Workload
Every Week	30.00
Every Week	30.00
Every Week	140.00

Resources
<i>Recommended Book Resources</i>
<p>James Wayman (Editor), Anil Jain (Editor), Davide Maltoni (Editor), Dario Maio (Editor), <i>Biometric Systems</i> [ISBN: 1852335963]</p> <p>Samir Nanavati, Michael Thieme, Raj Nanavati, <i>Biometrics</i> [ISBN: 0471099457]</p>
<i>Recommended Article/Paper Resources</i>
<p>1, <i>Biometrics: A tool for information security</i>, Vol. 1, No. 2 June 2006</p> <p>2, <i>An introduction to biometric recognition</i>, Vol. 14, No. 1, January 2004</p> <p>3, <i>Journal of cognitive neuroscience</i>,, 13(1), 1991</p>
<i>Other Resources</i>
<p>Internet based resource: <i>National Institute for Science and Technology (NIST)</i>  <a href="http://www.nist.gov/srd/biomet.htm">http://www.nist.gov/srd/biomet.htm</a></p>

**Module Delivered in**

Programme Code	Programme	Semester	Delivery
BN_KMACS_R	<a href="#">Master of Science in Computing in Applied Cyber Security</a>	2	Elective
BN_KMACS_M	<a href="#">Master of Science in Computing in Applied Cyber Security (Research)</a>	1	Group Elective 3