## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>COMP435</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Biometrics and Security</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
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</tbody>
</table>
| 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.

<table>
<thead>
<tr>
<th>Subject Synopsis/Indicative Syllabus</th>
<th>Topic</th>
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</table>
| 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. |
| 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. |
| 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.). |
| 4. **Typical behavioral 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.). |
| 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. |

**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

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>40%</td>
<td>✔ ✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Lab exercises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Project</td>
<td>20%</td>
<td>✔ ✔ ✔ ✔ ✔ ✔</td>
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<tr>
<td>4. Mid-term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Examination</td>
<td>40%</td>
<td>✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</table>

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact</th>
<th>Time</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>39 Hrs.</td>
</tr>
<tr>
<td>Tutorial</td>
<td>0 Hrs.</td>
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</tbody>
</table>

Other student study effort:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>17 Hrs.</td>
</tr>
<tr>
<td>Project</td>
<td>17 Hrs.</td>
</tr>
</tbody>
</table>

Total student study effort: 73 Hrs.

### Reading List and References

**Reference Books:**

13. Zhang, D. and Jain, A.K. (Eds.), *Advances in Biometrics*, International Conference...