

## INFORMATION SECURITY GROUP

### Course Specification 2016-17

<b>Code:</b>	IY5512	<b>Course Value:</b>	20	<b>Status:</b>	Core A
<b>Title:</b>	<b>Computer Security (Operating Systems)</b>		<b>Availability:</b>	Autumn term	
<b>Prerequisites:</b>	None		<b>Recommended:</b>	None	
<b>Co-ordinator:</b>	Daniele Sgandurra				
<b>Course Staff</b>	Daniele Sgandurra				
<b>Aims:</b>	<p>This course is concerned with security mechanisms in modern computer systems and will consider:</p> <ul style="list-style-type: none"> <li>• the core concepts: security policies, security models, subjects and objects, authorisation, and access rights</li> <li>• why operating systems and computer systems remain vulnerable to attack, and how vulnerable systems can be strengthened to increase their resistance to attackers</li> <li>• security issues for computer hardware and software</li> <li>• user authentication, including the use of tokens and biometrics</li> <li>• access control models and policies, and practical implementation of access control</li> <li>• how authentication and access control are implemented in commercial products</li> </ul>				
<b>Learning Outcomes:</b>	<p>On successful completion of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>• demonstrate a comprehensive understanding of the role of security mechanisms for modern computer systems, including both hardware and software</li> <li>• understand the mechanisms that are generally used to implement security policies, and be aware of key examples of mechanisms within particular hardware and operating systems</li> <li>• understand the use and operation of a range of access control mechanisms</li> <li>• understand the use and operation of a range of user authentication mechanisms</li> <li>• understand the main issues relating to software security and their effect on the security of computer systems</li> </ul>				
<b>Course Content:</b>	<ul style="list-style-type: none"> <li>• <i>Concepts and Terminology:</i> security; confidentiality, integrity and availability; security policies; security models; mandatory and discretionary access control; access control matrix, capabilities and access control lists; information flow</li> <li>• <i>Security Models:</i> information flow policies; role-based access control</li> <li>• <i>Implementation of Mechanisms:</i> security mechanisms in hardware and operating systems; memory management, memory protection and logical protection; access control lists</li> <li>• <i>User authentication:</i> passwords, biometrics and user tokens; identity management</li> <li>• <i>Case Studies:</i> Intel processor family; Windows; Linux; Android; IoT</li> <li>• <i>Operating system vulnerabilities:</i> how they can be exploited and how they can be prevented</li> <li>• <i>Software security:</i> buffer overflows and exploits; validation errors and exploits; languages that improve software security</li> </ul>				
<b>Teaching &amp; Learning Methods:</b>	<ul style="list-style-type: none"> <li>• Lectures and detailed case studies delivered by ISG staff and industry experts</li> <li>• Tutorial sessions</li> </ul>				
<b>Key Bibliography:</b>	<ul style="list-style-type: none"> <li>• D. Gollmann, <i>Computer Security</i>, John Wiley &amp; Sons, 2011 (3rd edition) – the main text.</li> <li>• C. P. Pfleeger, S. L. Pfleeger and J. Margulies, <i>Security in Computing</i>, Prentice-Hall, 2015 (5th edition).</li> <li>• M. Bishop, <i>Computer Security: Art and Science</i>, Addison-Wesley, 2003.</li> </ul>				
<b>Formative Assessment and Feedback:</b>	Tutorial sessions are used to provide feedback on student answers to exercise sheets, discuss model answers, and discuss any difficulties with course material. Formative feedback is provided on a comprehensive set of coursework.				
<b>Summative Assessment:</b>	<p><b>Exam</b> 100(%) This course is assessed solely by written examination consisting of a two-hour-exam (3 out of 5 questions).</p> <p><b>Coursework</b> 0(%) Coursework does not contribute to the final assessment for this course.</p> <p><b>Deadlines:</b> The written examination will be held in the Summer term</p>				

The information contained in this course outline is correct at the time of publication, but may be subject to change as part of the Department's policy of continuous improvement and development. Every effort will be made to notify you of any such changes.