

## UNIT 7 - IT Systems Security and Encryption (Mandatory Unit)

### Coursework Unit

Lesson No	Topic & Objectives	Big Question – What will students learn?	Key Activities & Specialist Terminology (Do Now Task / Starter/Tasks/Plenary)	Planned Assessment	Homework or flipped learning resources  DODDLE resources	Lit Num  SMSC Codes
1	<b>A1 Threat types*</b> Internal threats.	<b>Why is 'Bringing Your Own Device' a security threat?</b>	<ul style="list-style-type: none"> <li><b>Lead-in:</b> Discuss the relevance and importance of IT security. See link: The three greatest insider threats to your organisation, and how to beat them in the following link  <a href="http://www.itproportal.com/2014/05/30/the-three-greatest-insider-threats-to-your-organisation-and-how-to-beat-them/">www.itproportal.com/2014/05/30/the-three-greatest-insider-threats-to-your-organisation-and-how-to-beat-them/</a></li> <li><b>Tutor-led discussion:</b> Discuss learners' experience and knowledge of security threats.</li> <li><b>Paired activity:</b> Learners discuss what they consider to be an 'internal' threat and research the types of threats posed by staff within a company. Each pair presents findings to the whole class.</li> <li><b>Independent learning activity:</b> Learners complete a short report on why Bring Your Own Device (BYOD) is a security threat and how it can be dealt with.</li> </ul>	A.P1 Explain the different security threats that can affect the IT systems of organisations.  Completed report on the security issues with BYOD	Cybersecurity issues are often in news. Check out news websites such as the technology section of the BBC news website for the latest IT security issues – Write up notes from news stories that they find.	Lit  Social  So8  C3  Sp2  Sp5

			<ul style="list-style-type: none"> <li>• <b>Plenary:</b> Give feedback on activities. Sum up the lesson and hold a quick Q&amp;A session on the internal threats that exist in different environments</li> </ul>			
2	<b>A1 Threat types</b> External threats.	What security threats could affect the students at school	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> As a whole class, thought shower ideas about the meaning of 'external' threats.  <b>Paired activity:</b> Learners research recent examples of cyber-attacks from a variety of external resources and present findings. See links: Massive cyber-attack could trigger NATO response (June 2016), Second bank cyber-attack detected (May 2016), Cyber-attacks: Two-thirds of big UK businesses targeted (May 2016), DDoS: Website-crippling cyber-attacks to rise in 2016 (January 2016) and Cyber-attack news (multiple articles) in the following links:  Massive cyber attack could trigger NATO response (June 2016)  <a href="http://www.reuters.com/article/us-cyber-nato-idUSKCN0Z12NE">www.reuters.com/article/us-cyber-nato-idUSKCN0Z12NE</a>  Second bank cyber attack detected (May 2016)  <a href="http://www.bbc.co.uk/news/technology-36284446">www.bbc.co.uk/news/technology-36284446</a>  Cyber attacks: Two-thirds of big UK businesses targeted (May 2016)  <a href="http://www.bbc.co.uk/news/uk-36239805">www.bbc.co.uk/news/uk-36239805</a> </li> </ul>	A.P1 Explain the different security threats that can affect the IT systems of organisations.	Q&A on the external threats that exist in different environments.	Lit  Social  So8 C3 Sp2 Sp5

			<p>DDoS: Website-crippling cyber-attacks to rise in 2016 (January 2016)  <a href="http://www.bbc.co.uk/news/technology-35376327">www.bbc.co.uk/news/technology-35376327</a></p> <p>Cyber attack news (multiple articles)  <a href="http://www.cyberattack.news/">www.cyberattack.news/</a></p> <ul style="list-style-type: none"> <li>• <b>Independent learning activity:</b> Learners complete a short report on the types of external threats that could affect them at college/school or at home. They should retain their research notes and reports for future use.</li> </ul>			
3	<p><b>A1 Threat types</b>  Social engineering and software-driven threats.</p>	<p><b>'What is a computer virus?'</b></p>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> As a whole class, thought shower ideas about software-driven threats. Discuss 'What is a computer virus?' See video link: Difference Between Viruses, Worms and Trojans (3 minutes) in the following link: <a href="http://www.youtube.com/watch?v=y8a3QoTg4VQ">www.youtube.com/watch?v=y8a3QoTg4VQ</a></li> <li>• <b>Tutor-led discussion:</b> Discuss experience and knowledge of virus infections.</li> <li>• <b>Tutor presentation:</b> Introduce learners to the different types of software-driven threats.</li> <li>• <b>Paired activity:</b> Learners research recent examples of malware including virus attacks, ransomware etc and present their findings to the whole class. They should retain their research notes and reports for future use.</li> </ul>	<p>A.P1 Explain the different security threats that can affect the IT systems of organisations.</p>	<p>Learners should find out about viruses. See video link: Top 30 Dangerous Computer Viruses (27 minutes) in the following link: <a href="http://www.youtube.com/watch?v=QIqA66eYpC0">www.youtube.com/watch?v=QIqA66eYpC0</a></p>	<p>Lit</p> <p>Social</p> <p>So8</p> <p>C3</p> <p>Sp2</p> <p>Sp5</p>

			<ul style="list-style-type: none"> <li>• <b>Tutor-led discussion:</b> Discuss the meaning of 'social engineering' and how it works.</li> <li>• <b>Plenary:</b> Q&amp;A on malware.</li> </ul>			
4	<p><b>A2 Computer network-based threats*</b></p> <p>Passive threats.</p>	<p><b>'Why might people want to find a way into your computer?'</b></p>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Discussion, 'Why might people want to find a way into your computer?'</li> <li>• <b>Tutor presentation:</b> Introduce learners to the different types of passive threats. See link: Passive attack in the following link: <a href="http://whatis.techtarget.com/definition/passive-attack">http://whatis.techtarget.com/definition/passive-attack</a></li> <li>• <b>Paired activity:</b> Learners research the nature and effects of various types of passive threats.</li> <li>• <b>Tutor-led discussion:</b> Feedback on the activity.</li> <li>• <b>Plenary:</b> Discussion, should the government or police be allowed to eavesdrop on your electronic data?</li> </ul>	A.P2 Explain the principles of information security when protecting the IT systems of organisations	Research news websites such as the technology section of the BBC news website for the latest IT security issues	<p>Lit</p> <p>Social</p> <p>So8</p> <p>C3</p> <p>Sp2</p> <p>Sp5</p>
5	<p><b>A2 Computer network-based threats</b></p> <ul style="list-style-type: none"> <li>• Active threats.</li> <li>• Cloud computing risks.</li> </ul>	<p><b>How secure is cloud computing secure?</b></p>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Discussion on cloud computing – is it secure?</li> <li>• <b>Tutor presentation:</b> Introduce learners to the different types of active threats. See link: Active attack in the following link <a href="http://whatis.techtarget.com/definition/active-attack">http://whatis.techtarget.com/definition/active-attack</a></li> <li>• <b>Small group activity:</b> Each group researches a different active threat and prepares to present their findings to the class.</li> <li>• <b>Tutor-led discussion:</b> Learners present their ideas from the group activity to the whole class.</li> </ul>	A.P3 Explain why organisations must adhere to legal requirements when considering IT system security	The Stuxnet computer worm is said to have been developed by the US and Israeli governments to attack the Iranian nuclear programme, although they have never admitted this. Research what Stuxnet does	<p>Lit</p> <p>Social</p> <p>So8</p> <p>C3</p> <p>Sp2</p> <p>Sp5</p>

			<ul style="list-style-type: none"> <li>• <b>Plenary:</b> Feedback on activity. Test learners understanding with Q&amp;A on network threats.</li> </ul>		and how it has been used.	
6	<b>A3 Information security*</b>	<b>How do they think the principles of information security apply to this information?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Ask learners to think about what information security is and why it is important. Learners thought shower ideas and feed back to the whole group.</li> <li>• <b>Paired activity:</b> In pairs, learners discuss what sort of information about them is held electronically. How do they think the principles of information security apply to this information? How might this data be misused? Learners write up their notes and keep them for future reference.</li> <li>• <b>Tutor-led discussion:</b> Learners present their ideas from the paired activity to the whole class.</li> <li>• <b>Independent learning activity:</b> Learners research a number of given scenarios about their personal information. In each case, learners research who holds the information, who it is shared with and any privacy issues associated with it. Learners keep their research notes for future use.</li> <li>• <b>Plenary:</b> Feedback on individual activity. Test learners' understanding with a Q&amp;A session on information security.</li> </ul>	A.M1 Assess the impact that IT security threats can have on organisations' IT systems and business whilst taking account of the principles of information security and legal requirements.	Find out how to request your personal information – see link <a href="https://ico.org.uk/for-the-public/personal-information/">https://ico.org.uk/for-the-public/personal-information/</a>	Lit  Social  So8 C3 Sp2 Sp5
7	<b>A4 Legal requirements</b>	<b>What are the legal requirement</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Discuss the main legal requirements of IT security and which</li> </ul>	A.D1 Evaluate the effectiveness of the techniques	CryptoLocker is a well-know example of ransom for their	Lit

	<ul style="list-style-type: none"> <li>• Data Protection Act 1998.</li> <li>• Computer Misuse Act 1990.</li> <li>• Copyright, Designs and Patents Act 1988.</li> <li>• Telecommunications (Lawful Business Practice) (Interception of Communications) Regulations 2000.</li> <li>• Fraud Act 2006.</li> <li>• Legal liability and contractual obligations.</li> </ul>	<p><b>s of IT security</b></p>	<p>laws apply to IT security. See link: Guide to data protection:</p> <ul style="list-style-type: none"> <li>• Information relating to:</li> <li>• Data Protection Act (1998)</li> <li>• Computer Misuse Act (1990)</li> <li>• Copyright, Designs and Patents Act (1988)</li> <li>• Telecommunications (Lawful Business Practice) (Interception of Communications) Regulations (2000)</li> <li>• Fraud Act (2006).</li> <li>• Computers with internet connection for research.</li> <li>• Link for lead-in:</li> <li>• <a href="http://www.pcs.org.uk/en/resources/imembership/guide-to-data-protection.cfm">www.pcs.org.uk/en/resources/imembership/guide-to-data-protection.cfm</a></li> <li>• <b>Small group activity:</b> Learners research prosecutions under the different laws listed in the specification. Learners write up their notes and keep them for future reference.</li> <li>• <b>Tutor-led discussion:</b> Discuss how the legislation was applied, and the consequences.</li> <li>• <b>Independent learning activity:</b> Learners are given examples of situations where laws may have been broken and then identify which laws might apply.</li> <li>• <b>Plenary:</b> Prepare for next lesson's guest speaker.</li> <li>• <b>Independent learning activity:</b> Learners devise a given number of suitable questions for the guest</li> </ul>	<p>used to protect organisations from security threats whilst taking account of the principles of information security and legal requirements.</p>	<p>decryption. Research how CryptoLocker works, what effects it had on infected computers and how it was eventually disrupted.</p>	<p>Social</p> <p>So8</p> <p>C3</p> <p>Sp2</p> <p>Sp5</p>
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			speaker. If necessary, this task could be set as homework.			
8	<b>A5 Impact of security breaches*</b> <b>C7 Skills, knowledge and behaviours</b>	<b>What impact could a security breach have on an individual?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Discuss the impact of security breaches.</li> <li>• <b>Guest speaker:</b> IT manager from a local business talks about the importance of IT security, some of the threats that their business faces and the potential impact of security breaches. Learners ask the speaker their prepared questions.</li> <li>• <b>Small group activity:</b> Learners investigate examples of security breaches and consider the impact that they could have. Groups feed back their findings to the whole class.</li> <li>• <b>Plenary:</b> Discuss and ask learners questions about what sort of impact a security breach could have on them as individuals.</li> </ul>	A.D1 Evaluate the effectiveness of the techniques used to protect organisations from security threats whilst taking account of the principles of information security and legal requirements.	Students to research and make notes on the UK's 11 most infamous data breaches – see link <a href="http://www.techworld.com/security/uks-11-most-infamous-data-breaches-2015-3604586/">www.techworld.com/security/uks-11-most-infamous-data-breaches-2015-3604586/</a>	Lit  Social  So8 C3 Sp2 Sp5
9	<b>Summary of learning aim A and mock assessment</b> <b>C7 Skills, knowledge and behaviours*</b>	<b>Overview of Learning Aim A</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Recap what has been covered in this learning aim.</li> <li>• <b>Knowledge quiz:</b> Learners take a self-marked informal quiz covering the topics in learning aim A.</li> <li>• <b>Tutor presentation:</b> Introduce the mock assessment.</li> <li>• <b>Individual activity:</b> Learners work on the mock assessment.</li> <li>• <b>Plenary:</b> Q&amp;A on the mock assessment.</li> <li>• <b>Individual activity:</b> Learners complete the mock assessment as homework.</li> </ul>	A.D1 Evaluate the effectiveness of the techniques used to protect organisations from security threats whilst taking account of the principles of information security and legal requirements.	Research and make notes on ICMP is not used to send messages between computers. Instead it is used for diagnostic tool that uses ICMP is a program called Ping. Find out what Ping is for and how it can be used.	Lit  Social  So8 C3 Sp2 Sp5

10	<b>B1 Cryptographic principles*</b>	<b>What are the cryptographic principles?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Introduction to learning aim B and cryptography.</li> <li>• <b>Tutor presentation:</b> Introduction to cryptographic principles. See video link: Introduction to Cryptography (4.5 minutes) in the following link <a href="http://www.youtube.com/watch?v=68Pqir_mogA">www.youtube.com/watch?v=68Pqir_mogA</a></li> <li>• <b>Paired practical activity:</b> Learners use various cryptographic principles to try out simple cyphers.</li> <li>• <b>Tutor-led discussion:</b> Feedback on activity.</li> </ul>	B.P4 Explain the principles and uses of cryptography to secure and protect data	Students need to research and write about 'Can encryption be used to hide illegal activity? Should access to encryption be restricted?'	Lit  Social  So8 C3 Sp2 Sp5
11	<b>B2 Cryptographic methods</b> Key cryptography methods.*	<b>Should the government or police be able to eavesdrop on a person's electronic data?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Discussion around the computational hardness assumption. Will computers become too powerful for current encryption methods?</li> <li>• <b>Tutor presentation:</b> Introduce learners to the different cryptographic methods.</li> <li>• <b>Paired activity:</b> Learners research the way different cryptographic methods work.</li> <li>• <b>Tutor-led discussion:</b> Feedback on the activity, recap on the various methods.</li> <li>• <b>Plenary:</b> Discussion 'Should the government or police be allowed to eavesdrop on your electronic data?'</li> </ul>	B.P4 Explain the principles and uses of cryptography to secure and protect data	Carry out research to find out what the most common threats are to computer systems. There are a number of places you can go to research this question. The Open Web Application Security Project (OWASP) publishes a list of the 'top 10' web security risks from time to time. Companies that produce anti-malware software, such as Norton™,	Lit  Social  So8 C3 Sp2 Sp5

					McAfee and Kaspersky™, also publish lists of the most destructive malware	
12	<b>B3 Applications of cryptography</b> <b>The types and applications of cryptography.*</b>	<b>What are the different types of encryption methods?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Recap of cryptographic methods followed by Q&amp;A session to check learners' understanding.</li> <li>• <b>Tutor presentation:</b> Explanation of symmetric and public/private key encryption methods. See video link: Symmetric key and public key encryption (6.75 minutes) in the following link <a href="http://www.youtube.com/watch?v=ERp8420ucGs">www.youtube.com/watch?v=ERp8420ucGs</a></li> <li>• <b>Small group activity:</b> Each group researches a different application of encryption</li> <li>• <b>Tutor-led discussion:</b> Groups feed back on their research.</li> <li>• <b>Plenary:</b> Q&amp;A to check learners' understanding of encryption methods and applications.</li> </ul>	B.M2 Analyse how the principles and uses of cryptography impact on the security and protection of data	Computer forensic is a complex and fascinating topic. Research the tools and techniques which are used	Lit  Social  So8 C3 Sp2 Sp5
13	<b>Summary of learning aim B and mock assessment</b> <b>C7 Skills, knowledge and behaviours</b>	<b>What are the different types of encryption methods?</b>	<ul style="list-style-type: none"> <li>• <b>Lead-in:</b> Recap what has been covered in this learning aim.</li> <li>• <b>Knowledge quiz:</b> Learners take a self-marked informal quiz covering the topics in learning aim B.</li> <li>• <b>Tutor presentation:</b> Introduce the mock assessment.</li> <li>• <b>Individual activity:</b> Learners work on the mock assessment.</li> </ul>	B.M2 Analyse how the principles and uses of cryptography impact on the security and protection of data	Research the use of the A5/1 cypher to encrypt mobile phone communications is interesting to look into. Why for example, was a relatively short key length of 54 bits used rather than a	Lit  Social  So8 C3

			<ul style="list-style-type: none"> <li>• <b>Plenary:</b> Q&amp;A session on the mock assessment.</li> <li>• <b>Individual activity:</b> Learners complete the mock assessment as homework.</li> </ul>		more secure longer key? Are there other methods that can be used to protect mobile phone communications?	Sp2 Sp5
14	<b>Preparation for assessment C7 Skills, knowledge and behaviours*</b>	<b>Assignment work</b>	<ul style="list-style-type: none"> <li>• <b>Tutor-led discussion:</b> Give general group feedback on mock assessment for learning aim B.</li> <li>• <b>Revision session:</b> Recap learning aim A topics and any topics that learners struggled with on the learning aim A mock assessment.</li> <li>• <b>Tutor presentation:</b> Introduce the assignment for learning aims A and B.</li> <li>• <b>Independent learning activity:</b> Learners complete work schedule/plan for assessment, setting out when they plan to complete each part of the assignment.</li> <li>• <b>Plenary:</b> Q&amp;A on assessment.</li> </ul>	Completed coursework	Complete Case study on Page 317 on the BTEC Book	Lit  Social  So8 C3 Sp2 Sp5
15	<b>Assessment 1</b> (learning aims A and B)	<b>Assignment work</b>	<b>Assignment:</b> Learners work independently on the assignment for learning aims A and B. Learners complete this outside class time.	Completed coursework	Bluetooth is widely used for the short-range transmission of data between mobile devices. Although Bluetooth data packets are encrypted, there are a number of security issues when using	Lit  Social  So8 C3 Sp2

					Bluetooth. Find out how the data packets are encrypted and research the security issues involved when using Bluetooth	Sp5
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