

**Learning Programme**

**Fundamentals of communication and networking – AS Level**

Topic/Content	Objectives/Skills	Homework	Assessment	Stretch & Challenge (Thirst for Learning)
<b>The Internet</b>				
The Internet and how it works	<ul style="list-style-type: none"> <li>• Understand the structure of the Internet.</li> <li>• Understand the role of packet switching and routers.</li> <li>• Know the main components of a packet.</li> <li>• Define:               <ul style="list-style-type: none"> <li>○ router</li> <li>○ gateway.</li> </ul> </li> <li>• Consider where and why they are used.</li> <li>• Explain how routing is achieved across the Internet.</li> <li>• Describe the term 'uniform resource locator' (URL) in the context of internetworking.</li> <li>• Explain the terms 'fully qualified domain name' (FQDN), 'domain name' and 'IP address'.</li> <li>• Describe how domain names are organised.</li> <li>• Understand the purpose and function of the domain service and</li> </ul>	Watch Craig and Dave videos	Q and A's  Past exam papers  End of unit test  Homework and classwork worksheets and questions	Set up own network at home  Complete a cisco networking unit online in own time

	<p>its reliance on the Domain Name Server (DNS) system.</p> <ul style="list-style-type: none"> <li>• Explain the service provided by Internet registries and why they are needed.</li> </ul>			
Internet security	<ul style="list-style-type: none"> <li>• Understand how a firewall works (packet filtering, proxy server, stateful inspection).</li> <li>• Explain symmetric and asymmetric (private/public key) encryption and key exchange.</li> <li>• Explain how digital certificates and digital signatures are obtained and used.</li> <li>• Discuss worms, trojans and viruses, and the vulnerabilities that they exploit.</li> <li>• Discuss how improved code quality, monitoring and protection can be used to address worms, trojans and viruses</li> </ul>	Worksheet Q and A		
<b>The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol</b>				
TCP/IP	<ul style="list-style-type: none"> <li>• Describe the role of the four layers of the TCP/IP stack (application, transport, network, link).</li> <li>• Describe the role of sockets in the TCP/IP stack.</li> <li>• Be familiar with the role of MAC (Media Access Control) addresses.</li> <li>• Explain what the well-known ports and client ports are used for and the differences between them</li> </ul>			

<p>Standard application layer protocols</p>	<ul style="list-style-type: none"> <li>• Be familiar with the following protocols: <ul style="list-style-type: none"> <li>○ FTP (File Transfer Protocol)</li> <li>○ HTTP (Hypertext Transfer Protocol)</li> <li>○ HTTPS (Hypertext Transfer Protocol Secure)</li> <li>○ POP3 (Post Office Protocol (v3))</li> <li>○ SMTP (Simple Mail Transfer Protocol)</li> <li>○ SSH (Secure Shell).</li> </ul> </li> <li>• Be familiar with FTP client software and an FTP server, with regard to transferring files using anonymous and non-anonymous access.</li> <li>• Be familiar with how SSH is used for remote management.</li> <li>• Know how an SSH client is used to make a TCP connection to a remote port for the purpose of sending commands to this port using application level protocols such as GET for HTTP, SMTP commands for sending email and POP3 for retrieving email.</li> <li>• Be familiar with using SSH to log in securely to a remote computer and execute commands.</li> <li>• Explain the role of an email server in retrieving and sending email.</li> <li>• Explain the role of a web server in serving up web pages in text form.</li> </ul>	<p>Past exam papers</p>		
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	<ul style="list-style-type: none"> <li>Understand the role of a web browser in retrieving web pages and web page resources and rendering these accordingly.</li> </ul>			
IP address structure	<ul style="list-style-type: none"> <li>Know that an IP address is split into a network identifier part and a host identifier part.</li> </ul>			
Subnet masking	<ul style="list-style-type: none"> <li>Know that networks can be divided into subnets and know how a subnet mask is used to identify the network identifier part of the IP address.</li> </ul>			
IP standards	<ul style="list-style-type: none"> <li>Know that there are currently two standards of IP address, v4 and v6.</li> <li>Know why v6 was introduced.</li> </ul>			
Public and private IP addresses	<ul style="list-style-type: none"> <li>Distinguish between routable and non-routable IP addresses.</li> </ul>			
Dynamic Host Configuration Protocol (DHCP)	<ul style="list-style-type: none"> <li>Understand the purpose and function of the DHCP system.</li> </ul>			
Network Address Translation (NAT)	<ul style="list-style-type: none"> <li>Explain the basic concept of NAT and why it is used.</li> </ul>			
Port forwarding	<ul style="list-style-type: none"> <li>Explain the basic concept of port forwarding and why it is used.</li> </ul>			
Client server model	<ul style="list-style-type: none"> <li>Be familiar with the client server model.</li> <li>Be familiar with the Websocket protocol and know why it is used and where it is used.</li> </ul>			

	<ul style="list-style-type: none"> <li>• Be familiar with the principles of Web CRUD Applications and REST</li> <li>• CRUD is an acronym for: <ul style="list-style-type: none"> <li>○ C – Create</li> <li>○ R – Retrieve</li> <li>○ U – Update</li> <li>○ D – Delete.</li> </ul> </li> <li>• REST enables CRUD to be mapped to database functions (SQL) as follows: <ul style="list-style-type: none"> <li>○ GET → SELECT</li> <li>○ POST → INSERT</li> <li>○ DELETE → DELETE</li> <li>○ PUT → UPDATE.</li> </ul> </li> <li>• Compare JSON (Java script object notation) with XML.</li> </ul>			
Thin- versus thick-client computing	<ul style="list-style-type: none"> <li>• Compare and contrast thin-client computing with thick-client computing.</li> </ul>			