



## LONDON CAPITAL COMPUTER COLLEGE

### Advanced Diploma in Routing & Switching (112) – Fibre Optic Technology

<b>Prerequisites:</b> Networking knowledge.	<b>Corequisites:</b> A pass or higher in Diploma in IP Routing or equivalence.
<p><b>Aim:</b> The course focus on fiber optic communication systems technology including networks and peripherals. Topics include fiber optic technology, state-of-the-art networking systems, installation/repair of fiber optic systems, and testing equipment. This course will introduce the basic principles of light, optical fiber, sources and detectors, connectors and optical fiber systems, and will include applications, demonstrations and experiments. Topics in geometrical optics include ray analysis of mirrors, lenses, prisms, and optical systems. Topics in physical optics include polarization, interference, interferometry, and diffraction. The course explores optics through experiments in imaging, fiber optics, interferometry, diffraction, polarization, and laser beam propagation. This course combines the physics and science of fiber optics with instruction on optical fiber transmission, cable construction, safety codes and industry standards. Candidates will terminate and test multimode ST and SC connectors and will also be introduced to mechanical and fusion splicing and the OTDR. This program prepare candidates for careers in opto-electronics, including the design and application of systems for optical fiber communications, optical instrumentation, holography, image forming and processing, lasers and optical detection, as well as areas such as optical testing. The course objectives are: individuals with analytical and technical abilities to work effectively in optical engineering or related fields; individuals capable of advancing successfully in optical engineering or related fields; individuals prepared for both team and leadership roles in optical engineering or related fields.</p>	
<b>Required Materials:</b> Recommended Learning Resources.	<b>Supplementary Materials:</b> Lecture notes and tutor extra reading recommendations.
<b>Special Requirements:</b> The course requires a combination of lectures, demonstrations, discussions, and hands-on labs.	
<p><b>Intended Learning Outcomes:</b></p> <p>1. Describe optical fiber related terms, technologies, fiber optics history, plus reference material and application for analog and digital multimedia.</p> <p>2. Demonstrate how Fiber-optic cable is becoming an increasingly common replacement for traditional standard copper wire.</p>	<p><b>Assessment Criteria:</b></p> <p>1.1 Describe the history of fiber optics</p> <p>1.2 Analyse fiber optic cable applications</p> <p>1.3 Outline the fiber optic cable construction</p> <p>1.4 Analyse fiber optic propagation modes</p> <p>1.5 Describe fiber optic characteristics</p> <p>1.6 Discuss the different multimode and single mode fibre types</p> <p>1.7 Analyse fiber optic termination accessories</p> <p>1.8 Discuss the reasons for splicing fiber optic cables</p> <p>1.9 Outline fiber optic network design considerations</p> <p>1.10 Analyse advantages and disadvantages of using fiber optic</p> <p>2.1 Explore fiber optic metric system</p> <p>2.2 Analyse components of optical fiber</p> <p>2.3 Outline fiber performance specifications</p> <p>2.4 Describe installation and termination tools</p> <p>2.5 Describe fiber optic testing equipment</p>

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<p>3. Demonstrate how Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals and the lower attenuation and interference.</p>	<p>3.1 Describe analog/digital signals  3.2 Analyse fiber optic transmitter sources  3.3 Outline fiber optic system performance parameters  3.4 Explore fiber specifications  3.5 Outline fiber optic cable types</p>
<p>4. Describe fiber connector structure, fiber optic connector types and the way to terminate fiber optic cable.</p>	<p>4.1 Explore the different connectors  4.2 Analyse causes of connector/splice loss  4.3 Describe the termination procedures</p>
<p>5. Describe why every fiber optic cable plant need to be teste for end-to-end continuity and outline Fiber Optic Test Procedures (FOTPs).</p>	<p>5.1 Describe the reasons for testing after cables are installed, spliced and terminated  5.2 Describe the process of measuring power  5.3 Describe the process of testing loss  5.4 Analyse how OTDRs work</p>
<p>6. Describe Optical Network Design Implementation and the process of designing standard-compliant, reliable, and cost effective fiber optic networks.</p>	<p>6.1 Explore premises cable systems  6.2 Discuss outside plant applications  6.3 Outline the different network communications media  6.4 Describe outside plant versus premises cabling  6.5 Analyse cabling route considerations  6.6 Be able to conduct a loss budget analysis  6.7 Explore the documentation process  6.8 Analyse safety and building codes</p>
<p>7. Describe the standard that defines the use of fiber-optic cable (single and multimode) .</p>	<p>7.1 Discuss the functions of standards  7.2 Explore the TIA 568 standards  7.3 Explore the ISO/IEC International standards  7.4 Explore the different network cabling types  7.5 Explore the networking hardware</p>
<p>8. Describe the standard that defines the use of STP (shielded twisted pair) cable, and UTP (unshielded twisted pair) cable.</p>	<p>8.1 Outline network architectures  8.2 Analyse UTP cable characteristics  8.3 Explore UTP termination process  8.4 Be able to install UTP cabling  8.5 Outline UTP cabling testing process</p>
<p>9. Outline fibre suitable deployments and describe its advantages and disadvantages.</p>	<p>9.1 Outline the roles of fiber optic in a premises network  9.2 Describe fiber suitable for premises network</p>
<p>10. Outline why more and more networks are operating without cables.</p>	<p>10.1 Analyse different wireless networks  10.2 Describe wireless standards  10.3 Outline wireless design requirements</p>

**Recommended Learning Resources:  
Fibre Optic Technology**

<p><b>Text Books</b></p>	<ul style="list-style-type: none"> <li>• Fibre Optics: And Glass Integrated Optics by Hans Bach and Dieter Krause ISBN-10: 3540585958</li> <li>• Fibre Optics Communication: Key Devices by Herbert Venghaus and Norbert Grote ISBN-10: 364220516X</li> <li>• Optical Fibres and Fibre Optic Communication Systems by Subir Kumar Sarkar ISBN-10: 8121914590</li> <li>• Fiber-Optic Communication Systems by Govind P. Agrawal. ISBN-10: 0470505117</li> <li>• Optical Networks: A Practical Perspective by Rajiv Ramaswami, Kumar Sivarajan and Galen Sasaki. ISBN-10: 0123740924</li> <li>• Introduction to Optical Communication, Lightwave Technology, Fiber Transmission, and Optical Networks by Lawrence Harte and David Eckard. ISBN-10: 1932813292</li> </ul>
<p><b>Study Manuals</b></p> 	<p>BCE produced study packs</p>
<p><b>CD ROM</b></p> 	<p>Power-point slides</p>
<p><b>Software</b></p> 	