

## Course Map – Aerospace Fiber Optics

UNIT	LEARNING OBJECTIVES AND LECTURE TOPICS	CORRESPONDING ASSIGNMENTS/SKILL CHECKS
	<p><b>Course Learning Objectives</b></p> <ol style="list-style-type: none"> <li>1. Describe and apply basic principles of how fiber optics work</li> <li>2. Work safely with materials used for fiber optic routing, installation, assembly, cleaning and testing</li> <li>3. Handle fiber optic material to protect the cables from damage during assembly, routing and installation, cleaning and testing</li> <li>4. Route and install fiber optic assemblies with proper routing, protection, tying, support, slack, and drip loops</li> <li>5. Inspect and evaluate fiber optic termini for cleanliness and damage</li> <li>6. Clean fiber optic termini</li> <li>7. Determine your light loss budget and test fiber optic cables</li> </ol> <p>Course Topics</p> <ul style="list-style-type: none"> <li>• Fiber Optic Familiarization</li> <li>• Fiber Optic Assembly</li> <li>• Fiber Optic Routing and Installation</li> <li>• Fiber Optic Inspection and Evaluation</li> <li>• Fiber Optic Cleaning</li> <li>• Fiber Optic Testing</li> </ul>	
1	<p><b>Session Learning Objectives</b></p> <ol style="list-style-type: none"> <li>1. Describe and apply basic principles of how fiber optics work               <ol style="list-style-type: none"> <li>1.1. Identify your Engineering Authority</li> <li>1.2. Identify general requirements for working with fiber optics</li> <li>1.3. Describe fiber optic transmission principles</li> <li>1.4. Define common fiber optic terms</li> <li>1.5. List fiber optic handling procedures</li> <li>1.6. Identify fiber optic assemblies</li> <li>1.7. List safety hazards associated with fiber optics</li> </ol> </li> </ol>	<p>1.1-2 <b>Activity 1:</b> Q &amp; A Review (20-30 min)</p> <p><b>Homework</b> No homework assignments are required, but it would be beneficial for students to review the student manual—reading over that day’s notes and looking over the notes for the next session, so they are better prepared for and have some familiarity with the coming content.</p> <p><i>(Note: This class has “Exercises” and “Activities.” The</i></p>

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	<p><b>2. Work Safely with Materials used for fiber optic routing, installation, assembly, cleaning and testing</b></p> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Introduction <ul style="list-style-type: none"> <li>▪ Transmission principles</li> </ul> </li> <li>○ Fiber Optic Familiarization <ul style="list-style-type: none"> <li>▪ Terms &amp; Definitions</li> <li>▪ Authority (Controlling document)</li> <li>▪ What is it?</li> <li>▪ History</li> <li>▪ Material Handling</li> <li>▪ Assembly Identification</li> <li>▪ Do's and Don'ts</li> <li>▪ Personal Safety <ul style="list-style-type: none"> <li>• Fiber Optic Hazards – Safety</li> </ul> </li> </ul> </li> </ul>	<p><i>main difference is length. Exercises are complex projects that take hours and Activities are thirty minute review periods or brief tasks that teach one relatively straightforward, hands-on skill.)</i></p>
<b>2</b>	<p><b>Session Learning Objectives</b></p> <p><b>2. Work safely with materials used in fiber optic assembly</b></p> <p><b>3. Handle fiber optic material to protect the cables from damage during assembly, routing and installation, cleaning and testing</b></p> <p>3.1. <b>Insert fiber optic termini into connector / inserts.</b></p> <p>3.2. <b>Remove fiber optic termini from connector / inserts.</b></p> <p>3.3. <b>Assemble fiber optic cable connectors.</b></p> <p>3.4. <b>Apply bundle ties.</b></p> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Safety</li> <li>○ Material Handling</li> <li>○ Assembly <ul style="list-style-type: none"> <li>▪ Installation of Fiber Optic Termini into</li> </ul> </li> </ul>	<p>3.1-3.4 <b>Exercise 1:</b> Assemble Fiber Optic Cables (1.5 hours)</p> <p>2, 3.1-3.4 <b>Activity 2:</b> Q &amp; A Game (20-30 min)</p> <p><b>Homework</b></p> <p>No homework assignments are required, but it would be beneficial for students to review the student manual—reading over that day's notes and looking over the notes for the next session, so they are better prepared for and have some familiarity with the coming content.</p>

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	<p style="text-align: center;">Connectors</p> <ul style="list-style-type: none"> <li>▪ Removal of Fiber Optic Termini from Connectors</li> <li>▪ Build up of Connector</li> </ul>	
<b>3</b>	<p><b>Session Learning Objectives</b></p> <ol style="list-style-type: none"> <li>2. <b>Work safely with materials used for fiber optic routing and installation.</b></li> <li>4. <b>Route and install fiber optic assemblies with proper routing, protection, tying, support, slack, and drip loops</b> <ol style="list-style-type: none"> <li>4.1. <b>Properly handle fiber optic material during routing and installation to prevent damage during the installation process.</b></li> <li>4.2. <b>Properly route and install fiber optic assemblies with routing, protection, tying, support, slack and drip loops.</b></li> <li>4.3. <b>Properly install connector receptacles.</b></li> <li>4.4. <b>Properly mate connectors.</b></li> </ol> </li> </ol> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Safety</li> <li>○ Material Handling</li> <li>○ Bundle Tying <ul style="list-style-type: none"> <li>• Protection</li> <li>• Lock Stitch</li> <li>• Panduit's</li> <li>• Tape Tie</li> </ul> </li> <li>○ 4 Activities</li> <li>○ Support <ul style="list-style-type: none"> <li>▪ Drip loop</li> <li>▪ Slack</li> </ul> </li> <li>○ Practice per Quality Requirements</li> <li>○ Routing and Installation</li> </ul>	<p>4.2 <b>Activity 3:</b> Adhesive Tying Practice (10 min)</p> <p>4.2 <b>Activity 4:</b> Plastic Tie Installation Practice (10 min)</p> <p>4.2 <b>Activity 5:</b> Tying a clove hitch knot (10 min)</p> <p>4.2 <b>Activity 6:</b> Tying fiber optic bundles to other wire bundles with String ties (10 min)</p> <p>4.1-4.4 <b>Exercise 2:</b> Installation and Routing Practice (1.5 hours)</p> <p>2, 4.1-4.4 <b>Activity 7:</b> Q &amp; A Game (20-30 min)</p>

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	<ul style="list-style-type: none"> <li>▪ Routing Requirements</li> <li>▪ Slack</li> <li>▪ Drip Loop</li> <li>▪ Clamping                         <ul style="list-style-type: none"> <li>• Protection</li> </ul> </li> <li>▪ Installation of Connector Receptacles</li> </ul>	
<b>4</b>	<p><b>Session Learning Objectives</b></p> <p><b>2. Work safely with materials used for examining and cleaning fiber optic assemblies</b></p> <p><b>5. Inspect and evaluate fiber optic termini for cleanliness and damage</b></p> <p style="padding-left: 40px;"><b>5.1. Properly handle fiber optic material to protect the cables from damage during the examining and cleaning process.</b></p> <p style="padding-left: 40px;"><b>5.2. Inspect and properly evaluate fiber optic termini for cleanliness and damage.</b></p> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Safety</li> <li>○ Material Handling</li> <li>○ Continuity testing</li> <li>○ Inspection and Evaluation                         <ul style="list-style-type: none"> <li>▪ Cleanliness</li> <li>▪ Damage</li> </ul> </li> <li>○ Inspection review</li> </ul>	<p><b>5.1-5.2 Exercise 3: End Face Examination (1.5 hours)</b></p>
<b>5</b>	<p><b>Session Learning Objectives</b></p> <p><b>6. Clean fiber optic termini</b></p> <p style="padding-left: 40px;"><b>6.1. Properly clean fiber optic termini</b></p> <p style="padding-left: 40px;"><b>6.2. Examine fiber optic end faces</b></p> <p style="padding-left: 40px;"><b>6.3. Evaluate fiber optic end faces</b></p> <p style="padding-left: 40px;"><b>6.4. Reevaluate fiber optic end faces</b></p>	<p><b>6.1-6.4 Exercise 4 Cleaning Practice (1.5 hours)</b></p>

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	<p><b>6.5. Mate connectors used with fiber optic cables</b></p> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Cleaning Procedures, Termini End Face Cleaning <ul style="list-style-type: none"> <li>▪ Clean Blast</li> <li>▪ Dry Swab</li> <li>▪ Wet Swab</li> <li>▪ Pen</li> </ul> </li> <li>○ Alignment Sleeve <ul style="list-style-type: none"> <li>▪ Inspection</li> <li>▪ Cleaning</li> </ul> </li> </ul>	
6	<p><b>Session Learning Objectives</b></p> <p><b>7. Determine your light loss budget and test fiber optic cables</b></p> <p>7.1. <b>Test fiber optic light loss</b></p> <p>7.2. <b>Properly perform an optical loss test</b></p> <p>Session Topics</p> <ul style="list-style-type: none"> <li>○ Light Loss Testing <ul style="list-style-type: none"> <li>▪ Budget</li> <li>▪ Set up</li> <li>▪ Process</li> </ul> </li> <li>○ Testing Review</li> <li>○ Final Review</li> </ul>	<p>7.1-7.2 <b>Exercise 5: Testing (1 hour)</b></p> <p><b>Activity 8: Q &amp; A Game &amp; Final Review (20 -30 min)</b></p> <p><b>Final Exam: (1.5 hours)</b></p>