Outline for Material in addition to Amatrol

1 Units

Segment 1 - Units and Measurements
Objective 1 - Measurement Systems before SI
Objective 2 - Basic units and derived units
Objective 3 - Dimensional Analysis and dimensional equations
Objective 4 - Convention for writing numbers and units
Objective 5 - Definition of Fundamental Units Commonly used units outside SI system
Objective 6 - Commonly used units outside SI system
Objective 7 - Conversion of units between systems
Segment 2 - Wide range of lengths and distances in physical world
Objective 8 - Video- Powers of ten
Segment 3 - Practical uses of measurements and ranges for L, M, and T
Objective 9 - Physical examples for ranges of length, mass and time
Objective 10 - Example -Measuring the distance to a celestial object
Segment 4 - Measuring electronic data
Objective 11 - Origins of electrical communication: Morse code
Objective 12 – What are bits, nibles and bytes?

2 Understanding Cleanroom Manufacturing

Objective 1 - What is a cleanroom?
Objective 2 - Cleanroom Classification
Objective 3 - Controlling environment
Objective 4 - Gowning procedure
Objective 5 - Good safety habits
Objective 6 – Dos and Don'ts

3 Ethics and Intellectual Property

Segment 1 - Ethics
Objective 1 - What is Ethics
Objective 2 - Code of Ethics
Objective 3- Ethical business conduct principles
Objective 4 - Ethical business conduct test
Objective 5 - Business courtesy principles
Segment 2 - Intellectual Property
Objective 6 - What is Intellectual Property and types of IP
Objective 7 - How is Intellectual Property generated?
Objective 8 - Importance of maintaining a Lab Notebook
Objective 9 - Learn more about USPTO: US patent and Trademark Office

4 Graphs

Segment 1 - Data Presentation and Excel
Objective 1 - Describing a plot: Examine axes, units and ranges
Objective 2 - Observe the shape and trend in data
Objective 3 - Learn to use Excel for tabulating and graphing
Objective 4 - Types of graphs: Bar Graphs
Objective 5 - Types of graphs: Line graphs
Segment 2 - How to present results and analysis in Powerpoint
Objective 6 - Powerpoint Basics

5 Communications

Objective 1 - Oral communication: how to introduce yourself- develop your elevator speech
Objective 2 - Write important learnings and observations daily in your Lab Notebook

6 Lean Manufacturing and 5S

Objective 1 - What is LEAN, origin and benefits of LEAN
Objective 2 - First pillar- **S**ort - workflow free from distraction
Objective 3 - Second pillar- **S**et in order - proper placement of tools
Objective 4 - Third pillar - **S**hine - checklists, cleaning, maintenance logs
Objective 5 - Fourth pillar - **S**tandardize - consistency from day to day, shift to shift
Objective 6 - Fifth pillar - **S**ustain - diligence and engagement of employees - rewards
Objective 7 - Sixth pillar - **S**afety - Correct equipment, training, safe workplace, emergency response

7 Introduction to Six Sigma Tools

Objective 1 - What is Six Sigma?
Objective 2 - What are they and how to make Process Maps
Objective 3 - Pareto Charts to prioritize and analyze data
Objective 4 - Cause and Effect Diagrams- fish-bones
Objective 5 – C&E Matrix
Objective 6 - Failure Mode Effects Analysis FMEA

8 Introduction to Photolithography

Objective 1 - What is photolithography?
Objective 2 - Silicon single crystals as substrates
Objective 3 - Basic steps in photolithography
Objective 4 - Importance of surface conditioning
Objective 5 – Spin Coating and soft bake
Objective 6 - Masks and importance of alignment
Objective 7 - Photoresists and how they work
Objective 8 - UV exposure and pattern development
Objective 9 - Final stages leading to packaging- think yields
Objective 10 – Thin film deposition an important necessity in Photolithography

9 From Light To Photonics

Objective 1 - What is light and the electromagnetic spectrum including visible light?
Objective 2 - Electric and magnetic components of light waves
Objective 3 - Difference between polarized and un-polarized light
Objective 4 - Basic properties of light and video for Introduction to Photonics
Objective 5 - Differences between light sources: Sun, bulb and laser
Objective 6 - Manipulating light for propagation
Objective 7 - Fiber optic cables and cladding
Objective 8 - Videos on applications enabled by optical fibers: internet driverless cars, etc.
Objective 9 - Photonic components and waveguide devices
Objective 10 - RF and microwave Bandwidths and applications operating there
Objective 11 - Schematic of a chip fabrication process
Objective 12 - Advantages of Integrated Photonics and comparison with electrons
Objective 13 - Wavelength regions of electromagnetic spectrum used for optical communications and Integrated photonics

10 Celebrating Light: Final Presentations

Objective 1- Select a topic of your interest that is related to Light and Photonics
Objective 2 - Prepare 5 slides to explain the concept behind this application
Objective 3 - Use your presentation skills to communicate this topic to your peers in 5-10 minutes
Objective 4 - Answer questions from audience