The Essential Seminar

Institute of Packaging Professionals

Fundamentals of Packaging Technology *Seminar*

Fundamentals of Packaging Technology is divided into semesters to give you maximum flexibility in taking the seminar.

1. Take the entire seminar

It is 10 classroom days that encompass four semesters. We've split the two weeks apart to reduce the impact on your work schedule. Take one week in the first month, then take the second week a month later.

2. Or, just take just part of the seminar

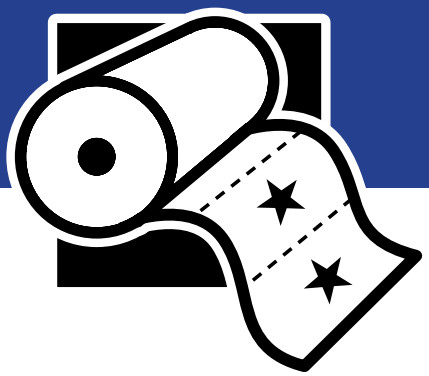
Content is divided into four, 2-1/2 day semesters. Each seminar focuses on specific areas of packaging. You can take just one semester, for a 2-1/2-day time commitment. And you can take additional semesters that focus on your educational needs.

What is each semester's content?

The following pages outline the seminar's curriculum in detail. Each semester 2-1/2-days long, and the detailed curriculum gives you the schedule and content for each day.

For details and registration:
www.iopp.org/fundamentals

Semester 1



Day One

- ***Course Introduction***
- ***Course Overview***
- ***Course Logistics***

1-1 Perspective on Packaging

- Demographic Workshop: Part One
- A definition of packaging
- The historical evolution of packaging and packaging materials
- The industrial revolution and packaging
- Growth of modern packaging roles
- The modern packaging industry

1-2 Package Development Process

- Management of the packaging function
- Project Scope and objectives
- The package development process
- The package design brief
- Specifications

1-3 Market Research

- Why perform market studies
- Market study tools
- Broad based studies
- Focused studies
- Updating persona through market research

1-4 Graphic Design

- Demographic Workshop: Part Two
- Technical and communication roles compared
- The importance of demographic and psychographic information
- The modern retail environment
- The package as the purchase motivator
- Fundamental messages: Cords of familiarity and points of difference
- Equity and brand names
- Emotional aspects of color
- Basics of graphic design: balance, unity, direction, typography and illustrations

Day Two

1-5 Introduction to Printing and Printing Methods

- Preparing the artwork, prepress proofing
- Package printing methods and printing presses
- Line art, color selection and Pantone Matching System
- Halftone art, screens and screen sizes
- Process art, moire patterns
- Color bleeds, trap, special colors

1-6 Printing Methods

Flexographic and Related Relief Printing Processes

- Nature and production of the printing plate
- Configuration of the printing station
- Advantages and limitations of flexography
- Offset letterpress (dry offset) and applications

Semester 1

Day Two, Cont.

Lithography

- Nature and production of the printing plate
- Configuration of the printing station
- Advantages and limitations of lithography
- Principal packaging applications of lithography

Gravure

- Nature and production of the printing plate
- Configuration of the printing station
- Advantages and limitations of gravure
- Principal packaging applications of gravure

Special Decorating Techniques

- Screen, heat transfer, hot stamp and pad printing, reflective metallics and surface gloss

Day Three

1-7 Color Perception

- Physics of color
- The human perception of color
- Additive and subtractive color synthetics
- Ink as a modifier of light
- The four process printing colors
- Standard color viewing conditions
- The visual comparison of colors

1-8 Electronic Product Coding

- EPC advantages through the supply chain
- EAN/UPC symbologies
- UPC structure
- RFID tags
- RFID readers
- RFID advantages
- RFID limitations

1-9 Labels and Labeling

- The functions of a label
- Types of labels
- Label forms
- Label materials
- Affixing labels

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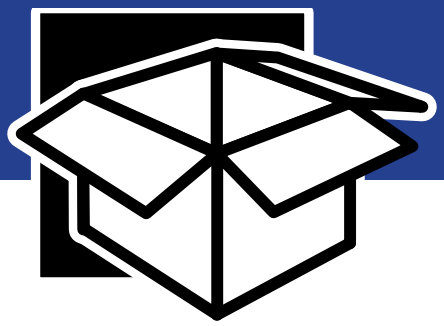
Semester 2



Day One

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2-1 Paper and Paperboard

- Fiber sources and fiber quality
- Furnish make-ups
- Fourdrinier and cylinder-type paper machines
- Machine direction and cross direction
- Coatings, calendaring and other treatments
- Paper characterization
- Paper and paperboard grades and applications

2-2 Folding Cartons

- General paperboard construction classes
- General design considerations
- Tube-style folding cartons: basic designs and variations
- Tray-style cartons: basic designs and variations
- Dimensioning, grain direction
- Die-boards and paperboard cutting and creasing
- Folding carton manufacture
- Set-up boxes, designs, applications and limitations

2-3 Corrugated Fiberboard

- Containerboard grades and standard flute sizes
- General applications of standard flutes
- Mullen Test and edge crush tests (ECT)
- Using McKee formula to estimate box compression strength
- Carrier rules and regulations
- Corrugated board manufacture
- Single, double and triple wall boards
- Microflute and wave flute comparisons

Day Two

Please bring a calculator

2-4 Corrugated Boxes

- Regular slotted container (RSC) production and styles
- Die cut container production and style examples
- Bliss box styles
- Decorating by direct printing (post printing)
- Preprint, litho labeling and litho laminating options
- Scoring allowances
- Dimensioning corrugated containers and pads
- General industry tolerances
- Wax and other treatments

2-5 Box Compression Strength Workshop

- Standard compression strength measurement
- Difference between compression strength and stacking strength
- Impact of humidity, time, pallet pattern and overhang
- Using Fibre Box Association stacking strength factors

Semester 2

Day Two, Cont.

- Calculating required compression strength
- Determining required ECT values to meet required stack strength
- Stacking HDPE bottles

2-6 Distribution Environment

- Package transport and distribution hazards
- A systems approach to distribution packaging
- Sources of shock inputs and effects
- Vibration sources, relative movement damage
- Resonance, stack resonance, load skewing
- Unit loads and unit load efficiency
- Tracking and acting on distribution losses
- Industry guidelines and practices
- Pallet issues
- Recommended minimum and maximum container dimensions
- Recommended load stability
- Good shipping practices

Day Three

2-7 Protective Packaging

- Understanding G factors
- Damage boundary curves
- Cushioning against shock
- Selecting cushioning materials
- Using dynamic cushioning tables
- Spring-mass relationships and isolating inputs

2-8 Pre-Shipment Testing

- Purpose
- ISTA test procedures
- ASTM D4 169 test procedures
- Planning a pre-shipment test

2-9 Industrial Packaging

2-10 Wood Packages

Semester 3

Day One

3-1 Introduction to Polymers

3-2 Polymer Chemistry

- Polymers, plastics and polymerization
- Polymer classifications
- Terminology and abbreviation
- Copolymers and properties
- A review of basic chemical concepts
- Polarity, solubility, permeability and barrier
- Coefficient of friction and adhesion
- Glass transition and melt temperatures
- Thermal history and crystallinity
- Oriented plastics and shrink plastics
- Hydrocarbons and polyethylene

3-3 Packaging Polymers

- Structure of HDPE, LDPE, LLDPE and mPE
- Polyethylene density and property trends
- Structure and general properties of polypropylene, poly(vinyl) and poly(vinylidene chloride), polystyrene, poly(vinyl alcohol), poly(vinyl acetate) and ethylene-vinyl acetate, polyamide, poly(ethylene terephthalate), other lesser used polymers
- Thermosets and thermoplastics compared; thermoset applications

3-4 Property Comparisons

- General properties of packaging polymers
- Factors affecting barrier properties
- Oxygen and moisture vapor barrier comparisons
- Classes of polymer additives

Day Two

3-5 Extrusion Molding

- Plasticating extruders
- Cast and blown plastic film and sheet
- Co-extruded and oriented plastic films
- Video presentation: Analytical and Physical Testing

3-6 Flexible Packaging

- Aluminum foil properties and applications
- Vacuum metallizing process
- Metallized paper and film applications
- Structural, barrier, sealing and aesthetic properties
- Basic form-fill-seal machines
- High barrier constructions
- Wet bond, dry bond, and extrusion laminating
- Specifying plies, caliper, and roll orientation
- Example laminate constructions

3-7 Thermoforming

- Extruded profiles and typical packaging applications
- Common thermoforming methods and materials
- Thermoform packaging applications

Semester 3

Day Two, Cont.

3-8 Injection Molding

- The injection molding process
- Injection molds, tooling costs
- Sprues, runners, gates and undercuts
- Part characteristics and packaging applications

Day Three

3-9 Blow Molding

- The extrusion blow molding process
- Parisons and parison programming
- The injection blow molding process
- Injection stretch blow molding
- Extrusion and injection blow molding compared
- General bottle design considerations

3-10 Bottle Design Criteria

- General design elements
- Decorating options
- Special bottle designs
- Environmental stress cracking

3-11 Closures

- Closure selection criteria
- Container finish standards and thread styles
- Closure dimension designations
- Closure liner functions and types
- Common plastic closure designs
- Metal continuous thread, lug, roll-on, press-on and crown closures
- Child-resistant and tamper-evident designs

Semester 4

Day One

4-1 Environmental Issues

- Defining packaging's role in the solid waste issue
- Proportion of packaging in the waste stream
- The four "R's" hierarchy: reduce, reuse, recycle and recover
- Environmental concerns and the consumer
- The packaging professional's role in the environmental issue

4-1A Sustainable Packaging

- The concept of cradle-to-cradle product design
- The need to push packaging system boundaries
- Central definitions of sustainable packaging
- Design strategies that implement the definitions
- Measuring sustainable packaging—Wal-Mart's sustainable scorecard
- No single "sustainable solution"
- Creating sustainable packaging strategies, yet implementing them one step at a time.

4-2 Adhesives

- Mechanical and specific theories of adhesion
- Surface tension and dyne level
- Adhesive viscosity
- Starch, dextrin, and casein adhesives and their applications
- Emulsion adhesives: advantages, applications, green strength
- Hot melt adhesives: advantages, and applications
- Elastomeric and cold seal adhesives: advantages and applications
- Good manufacturing practices
- Trouble shooting adhesive problems

Day Two

4-3 Metal Containers

- Can-making metals
- Welded, adhesive, bonded and mechanical clinch three-piece cans
- Shallow draw, draw and redraw, draw and iron two-piece cans
- Impact extruded cans and collapsible tubes
- Protective coatings and decorations
- Sizing conventions

4-4 Aerosols

- Component parts and operation
- Aerosol propellants and formulations
- Other pressurized dispensing systems
- Aerosol container legal requirements

4-5 Glass Packaging

- Raw materials for soda glass and special glasses
- The glass furnace and glass manufacture

Semester 4

Day Two, Cont.

- Blow-and-blow and press-and-blow bottle production
- Surface coatings and annealing
- Decorating options
- Video presentation: Glass Bottle Manufacture

4-6 Special Designs

Day Three

4-7 Packaging Machinery

- Package design and machine-ability
- The packaging machine industry
- Stock machines and custom machines
- Intermittent and rotary machine configurations
- Fast changeovers

4-8 Filling Systems

- Product categories and filler selection
- Fill-to-level liquid filling systems
- Fill-to-volume liquid filling systems
- Flask fillers
- Auger fillers
- Gravimetric filling
- Statistical combining methods or filling

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4-9 Production Line Workshop

- Basic design layout and assignment of machine speeds
- Efficiency and output, calculating production line efficiency
- Purpose and placement of buffers

4-10 Laws and Regulations

- Statutes versus regulations
- Role of the Federal agencies
- Fair Packaging and Labeling Act
- Food, Drug and Cosmetic Act
- Federal Insecticide, Fungicide and Rodenticide Act
- Hazardous Materials Transportation Act
- Miscellaneous acts impacting packaging

4-11 Packaging Software

- Standards Applications Use in Packaging
- Special Packaging Applications
  - Graphics Design
  - Structural Design
  - Specifications
  - Spatial Efficiency
  - Performance Design
  - Test and Measurement Support

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