



COURSE CATALOG

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Table of Contents

CPS-C01 Packaging Foundations	3
CPS-C02 Paperboard Cartons	7
CPS-C03 Corrugated Containers	10
CPS-C04 Glass Packaging	13
CPS-C05 Metal Packaging	15
CPS-C06 Polymers in Packaging	17
CPS-C07 Packaging Machinery	19
CPS-C08 Package Printing	21
CPS-C09 Sustainable Packaging	23
CPS-C10 Packaging Distribution	26
CPS-C11 U.S. Packaging Regulations	29
CPS-C12 Packaging Design Workflow	31
ISBT-I01 Fundamentals of Beverage Technology	34
Instructor: ISBT Beverage Institute	34
ELEC-E02 SolidWorks Basics	37
SolidWorks Advanced	45
ELEC-E03 Leveraging Human Factors and Consumer Behavior Theory in Packaging Design	48
ELEC-E01 Fundamentals of Temperature Assurance Packaging Certification	51
PTI-P01 Introduction to Polymers and PET	52
PTI-P02 PET Industry Overview, Manufacture and Properties	52
PTI-P03 Polymer to Preform	52
PTI-P04 PET Preform to Bottle	53
PTI-P05 Container Design and Development	53
PTI-P07 Barrier Container Technology	54
PTI-P08 PET Recycling	54

Table of Contents (cont'd.)

PTI-P09 Material Handling and Drying	55
PTI-P10 Blow Molding Process	55
ELEC-E05 Project Management Essentials	56
ELEC-E09 Liquid Filling	60
ELEC-E07 Bioplastics for Packaging	62
Augmented Reality for Packaging	62
ELEC-E08 Cannabis Packaging	63
ISBT-I02 Sanitation for Fountain Beverages	64
ISBT-I03 Beverage Ingredients Bundle	65
ISBT-I04 Beverage Gases: Argon, Oxygen, and Nitrogen	69
ISBT-I05 Introduction to Microbiology	70

CPS-C01 Packaging Foundations

80 Micro-Lessons, 8 hours

This course will serve as an introduction to the packaging industry and provide the fundamental knowledge necessary to get you up to speed. We'll overview the packaging development process and how it is typically managed within an organization. Packaging is a complex process that must be seen as part of a greater system, where each activity has an impact on the final package. Departments such as marketing, sales, procurement, legal, distribution, quality control, manufacturing and warehousing all have unique demands on the package design. After taking this course, you will have the thought process required of a successful stakeholder in the packaging development process.

Learning Objectives:

1. Understand the key phases of the packaging development process.
2. Identify the most popular packaging materials.
3. Establish the fundamental vocabulary required to communicate with stakeholders in the packaging development process.

1. Introduction

- 1.1. **Welcome to Packaging Foundations** (Video, 1:30): Overview of what you'll learn in the Foundations course
- 1.2. **What is Packaging?** (Video, 4:41): Definition, Functions, Levels, Types
- 1.3. **Evolution of Packaging** (Interactive, 16:00): The role of packaging in the evolution of society including major innovations advancing the industry
- 1.4. **Market Overview** (PDF, 3:00): Infographics that give a big picture overview of the size of the global packaging industry
- 1.5. **Stakeholders in Packaging** (Interactive, 5:00): High level overview of the different stakeholders involved in the development of a coffee beverage
- 1.6. **Careers in Packaging** (Text, 6:00): Who is who in packaging and how education leads to certain jobs
- 1.7. **Packaging Development Process** (PDF, 2:00): Packaging is a complex system with many components working together to achieve a universal goal
- 1.8. **Sustainability** (Video, 6:47): Overview of the options for more sustainable packaging practices
- 1.9. **Packaging Applications** (Infographic, 3:00): Type, description, materials, usage
- 1.10. **Know Your Product First** (Infographic, 4:00): Questions to ask surrounding "Understanding Your Product"

2. Wood

- 2.1. **Introduction to Wood** (Video, 1:40): Overview of the substrate and what you'll learn in this lesson
- 2.2. **Manufacturing Wood** (Video, 8:21): General ways to manufacture this substrate including machinery

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- 2.3. **Wood Packaging Types** (Video, 8:39): Different types and grades of this material and why this is important
 - 2.4. **Sustainable Wood Packaging** (Video, 2:51): How sustainability is measured for this substrate
 - 2.5. **Wood Design** (Video, 4:02): Disruptive wood designs in packaging
 - 2.6. **Wood Knowledge Check** (Quiz, 3 questions): Helps retain learnings from Foundations of Wood
- 3. Paperboard**
- 3.1. **Introduction to Paperboard** (Video, 1:34): General introduction to the substrate
 - 3.2. **Paperboard Packaging Industry Overview** (Infographic, 1:00): Overview of the global market
 - 3.3. **Manufacturing Paperboard** (Video, 3:19): General ways to manufacture this substrate including use of machinery
 - 3.4. **Paperboard Packaging Types** (Presentation, 8:00): High level overview of paperboard grades & package types
 - 3.5. **Sustainability in Paperboard** (Video, 2:08): How sustainability is measured for this substrate
 - 3.6. **Paperboard Design** (Video, 5:18): Disruptive designs in paperboard packaging
 - 3.7. **Paperboard Knowledge Check** (Quiz, 4 questions): Helps retain learnings from Foundations of Paperboard
- 4. Corrugated**
- 4.1. **Introduction to Corrugated** (Video, 1:24): General introduction to the substrate
 - 4.2. **Corrugated Industry Overview** (Infographic, 3:00): High level overview of the global market
 - 4.3. **Manufacturing Corrugated** (Video, 7:46): General ways to manufacture this substrate including use of machinery
 - 4.4. **Corrugated Variants** (Presentation, 7:00): Flute Styles & their applications
 - 4.5. **Corrugated Sustainability** (Presentation, 2:00): How sustainability is measured for this substrate
 - 4.6. **Customizing Corrugated for Your Application** (Video, 1:10): Dr. Hurley uses a sandwich order to demonstrate how corrugated can be customized to fit any situation
 - 4.7. **Corrugated Design** (Video, 4:28): Disruptive designs in corrugated packaging
 - 4.8. **Corrugated Knowledge Check** (Quiz, 5 questions): Helps retain learnings from Foundations of Corrugated
- 5. Glass**
- 5.1. **Glass Introduction** (Video, 2:03): General introduction to substrate
 - 5.2. **Glass Industry Overview** (Infographic, 1:00): Outline of the global market
 - 5.3. **Manufacturing Glass** (Text, 5:00): General ways to manufacture this substrate including use of machinery
 - 5.4. **Glass Packaging Types** (Video, 1:13): Different types and grades of this material and why this is important
 - 5.5. **Glass Design** (Video, 6:06): Disruptive designs in the glass packaging industry
 - 5.6. **Sustainability of Glass** (Video, 2:32): How sustainability is measured for this substrate
 - 5.7. **Glass Knowledge Check** (Quiz, 3 questions): Helps retain learnings from Foundations of Glass
- 6. Metal**
- 6.1. **Metal Introduction** (Video, 1:39): General introduction to the substrate
 - 6.2. **Metal Packaging Industry** (Infographic, 2:00): Overview of the global market
 - 6.3. **Manufacturing Metal** (Presentation, 8:00): General ways to manufacture this substrate including use of machinery
 - 6.4. **Metal Packaging Types** (Presentation, 6:00): Different types and grades of this material and why this is important
 - 6.5. **Sustainability of Metal** (Presentation, 3:00): How sustainability is measured for this substrate
 - 6.6. **Metal Design** (Video, 5:56): Disruptive Designs in metal packaging

6.7. **Metal Knowledge Check** (Quiz, 4 questions): Helps retain learnings from Foundations of Metal

7. Polymers

7.1. **Polymers Introduction** (Video, 2:11): General introduction to the substrate

7.2. **Plastic Packaging Industry Overview** (Infographic, 1:00): Introduction to the global market

7.3. **Fundamental Properties of Plastic Polymers** (Presentation, 20:00): High level overview of the properties of the substrate

7.4. **Polymer Manufacturing | Reaction Mechanisms** (Presentation, 5:00): Basic reaction mechanisms which are used to manufacture polymers

7.5. **Polymer Manufacturing | Machinery and Processes** (Presentation, 7:00): General ways to manufacture this substrate including machinery

7.6. **Plastic Packaging Types** (Presentation, 3:00): Different types and grades of this material and why this is important

7.7. **Plastics Design** (Video, 6:53): Disruptive designs using plastics

7.8. **Sustainability of Plastics for Packaging** (Presentation, 4:00): How sustainability is measured for this substrate

7.9. **Polymer Cheat Sheet** (Infographic, 5:00): Quick outline of the grades of polymer

7.10. **Polymers Knowledge Check** (Quiz, 5 questions): Helps retain learnings from Foundations of Polymers

8. Printing

8.1. **Printing Introduction** (Video, 1:33): General introduction to the processes and importance of printing

8.2. **Package Printing Industry Overview** (Infographic, 4:00): Overview of the global market and importance of printing

8.3. **Printing Processes** (Presentation, 6:00): High level overview of current print processes and technologies

8.4. **Inks for Package Printing** (Video, 4:51): Description of the types of inks available along with their properties

8.5. **Designing for Print** (Presentation, 3:00): Outline of ways print can be designed to stand out

8.6. **Sustainable Print Practices** (Video, 3:04): How sustainability is measured for printing

8.7. **Print Knowledge Check** (Quiz, 4 questions): Helps retain learnings from Foundations of Printing

9. Regulations

9.1. **Introduction to Laws and Regulations** (Video, 1:19): General introduction to the importance of regulating packaging practices

9.2. **Framework for Legal Requirements** (Text, 4:00): Overview of the principles of packaging law

9.3. **Regulations Agencies** (Text, 10:00): Outline of the regulatory requirements that apply to packaging materials and labeling

9.4. **Code of Federal Regulations** (Video, 1:47): Rules and regulations published in the Federal Register by departments and agencies of the U.S. government

9.5. **Major Packaging Laws** (Presentation, 18:00): Description of the most important packaging laws since 1900

9.6. **What's your Take?** (Discussion): Discussion of experiences with regulations and how packaging had to change to comply

10. Distribution

10.1. **Introduction to Distribution** (Video, 2:05): Explanation of how distribution systems are one of the most important industries within packaging

10.2. **Distribution by Land** (Presentation, 15:00): High level explanation of road and rail modes of transportation

- 10.3. **Distribution by Air** (Presentation, 10:00): High level explanation of the various methods of air transportation
- 10.4. **Distribution by Sea** (Presentation, 10:00): High level explanation of the various methods of sea transportation
- 10.5. **Distribution Containers** (Presentation, 18:00): Overview of the different types of material used for distribution containers
- 10.6. **Dunnage and Cushioning** (Video, 10:44): Discussion of the number of ways product can be damaged in transit and how to best keep that from happening
- 10.7. **Testing and Protocols** (Text, 5:00): High level outline of the types of tests it is important to perform on package types

11. **Wrap Up**

- 11.1. **That's a Wrap!** (Video, 1:16): Conclusive outline of Packaging Foundations
- 11.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
- 11.3. **Provide Your Feedback** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C02 Paperboard Cartons

52 Micro-Lessons, 6 hours

This course provides you with a 360° view of the papermaking, converting, and paperboard packaging industry.

Learning Objectives:

1. Overview the paperboard industry from its evolution to the potential of the various packaging types today.
2. Understand the complete manufacturing process of converting raw materials to a substrate with coatings and treatments.
3. Identify paperboard grades and their specific applications.
4. Evaluate the various properties of paperboard and how they contribute to a structure that passes testing standards and sustainability guidelines.
5. Find inspiration for selecting paperboard styles designed, printed and finished with maximum consumer appeal.
6. Work with suppliers to bring to life the paperboard carton you envision.

1. Paperboard Beginnings

- 1.1. **Navigation Tutorial** (Video, 2:41): Instructions on how to move through the course
- 1.2. **Welcome** (Video, 1:06): Outline of the Paperboard course
- 1.3. **Evolution of Paperboard** (Interactive, 20:00): Outlining the use of paperboard from ancient times to present day
- 1.4. **Industry Overview** (Infographic, 2:00): Worldwide landscape of paperboard cartons
- 1.5. **Paperboard Packaging Potential** (Text, 4:00): Overview of the versatile uses of paperboard as a packaging material
- 1.6. **Paperboard Packaging Types** (Presentation, 8:00): Discussion of the different grades, styles and coatings available for paperboard
- 1.7. **Glossary** (Text): Terms to learn when discussing paperboard packaging
- 1.8. **Paperboard Cartons Orientation - Let's get to know each other** (Discussion): Students introduce themselves and what they are hoping to get from the course

2. Paperboard Manufacturing

- 2.1. **Paperboard Manufacturing Introduction** (Video, 0:38): This lesson demonstrates the importance of how paper is made
- 2.2. **Manufacturing Paperboard** (Text/Video 4:00): Overview of how trees are turned into paper
- 2.3. **Pulping Process** (Video, 11:42): Details the first step in the paper making process
- 2.4. **Papermaking Process** (Video, 8:49): Overview of the two commercial ways of converting pulp into paperboard: Fourdrinier Machine Process & Cylinder Machine Process
- 2.5. **Paper vs. Paperboard** (Text, 1:00): What is the distinguishing factor between paper and paperboard?
- 2.6. **Surface Coatings and Treatments** (Text, 3:00): How paperboard can be enhanced through surface coatings and treatments
- 2.7. **Knowledge Check: Paperboard Manufacturing** (Quiz, 6 Questions): Helps retain learnings from Paperboard Manufacturing

3. Paperboard Grades

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- 3.1. **Introduction to Paperboard Grades** (Video, 0:44): Overview of the most common grades
- 3.2. **Overview of Paperboard Grades** (Text, 2:00): Outline of paperboard categories
- 3.3. **Paperboard Grades Video** (Video, 8:00): Discussion of the various paperboard grades with real-world examples
- 3.4. **Paperboard Grades Cheat Sheet** (Infographic, 3:00): Quick reference outline of all common paperboard grades
- 3.5. **Knowledge Check: Paperboard Grades** (Quiz, 3 questions): Helps retain learnings from Paperboard Grades
- 3.6. **Open-ended Question** (Discussion, 5:00): Encourages students to think about packaging problems using high level problem solving
- 3.7. **Open-ended Answer** (Discussion, 5:00): Provides answer to previous question
- 4. Properties and Testing**
 - 4.1. **Introduction to Properties and Testing** (Video, 1:11): Explains why properties and testing are important when dealing with paperboard
 - 4.2. **Testing Standards** (Text, 7:00): Reference module for the most relevant ASTM and TAPPI test protocol relevant to paperboard carton packaging
 - 4.3. **Physical/Performance Properties** (Text, 15:00): Details common issues regarding physical attributes of paperboard
 - 4.4. **Surface, Optical and Electrical Properties** (Text, 10:00): Terminology that is used to reference the surface and optical qualities of paperboard and how to test for the desired characteristics of these properties
 - 4.5. **Defects** (Text, 10:00): How to fix it or avoid the common problems with paperboard
 - 4.6. **Sustainability in Paperboard** (Video, 2:08): Exemplifies paper's sustainable qualities
 - 4.7. **Knowledge Check: Properties and Testing** (Quiz, 5 questions): Helps retain learnings from Properties and Testing
- 5. Paperboard Styles**
 - 5.1. **Paperboard Styles** (Video, 0:50): Introduction to the various styles discussed in this lesson
 - 5.2. **Overview of Styles** (Video, 3:53): Overview of tubes, trays, closures, glue, and dieline
 - 5.3. **Miscellaneous Carton Styles** (Text, 8:00): Brief review the miscellaneous styles of paperboard cartons
 - 5.4. **Design Inspiration Flipbook** (Presentation, 5:00): Library of disruptive designs
 - 5.5. **Tube Selector** (Presentation, 5:00):
 - 5.6. **Tray Selector** (Presentation, 5:00):
- 6. Carton Design**
 - 6.1. **Design** (Video, 0:29): Introduction to designing with paperboard
 - 6.2. **Board Caliper Matrix** (Infographic, 5:00): Chart of 3 items from each of the 17 FMCGs
 - 6.3. **Structural Design** (Video, 7:16): Review of ArtiosCAD and illustrator for paperboard design
 - 6.4. **Finishes** (Text, 10:00): Discussion of the most widely used finishes in the paperboard industry
 - 6.5. **Printing on Paperboard** (Text, 5:00): Overview of printing methods for paperboard
 - 6.6. **Print Selector Strategy** (Video, 3:21): How to choose the best print option for your package
 - 6.7. **Designing a Carton** (Discussion, 10:00): Assignment encouraging students to use critical thinking when designing a specific package
- 7. Procurement and Production**
 - 7.1. **Ready for Order** (Video, 0:45): Outline of steps needed before ordering the correct paperboard
 - 7.2. **Supplier Qualifications** (Text, 5:00): Guidelines to help decide the right supplier
 - 7.3. **Die Cutting and Die Making** (Presentation, 5:00): Overview of diecutting and laser cutting methods

- 7.4. **Assembly** (Text, 10:00): Steps to take after die cutting
- 7.5. **Carton Cost Calculator** (Tool, 5:00): Supply dimensions, coatings, quality, and colors into the calculator which will give you a price quote
- 7.6. **Supplier Database** (Chart, 5:00): Listing of common suppliers worldwide

8. **Wrap Up**

- 8.1. **Wrap Up** (Video, 0:59): Conclusive outline of Paperboard Cartons
- 8.2. **Final Exam** (Test, 23 Questions): Questions pulled from every section of the course
- 8.3. **Quick Survey** (Survey): Collects student responses to help The Packaging School continue to improve
- 8.4. **Congratulations!** (Text): Invitation to join the Packaging School LinkedIn group

CPS-C03 Corrugated Containers

55 Micro-Lessons, 6 hours

This course teaches you the science of engineering a corrugated container for any application.

Learning Objectives:

1. Define corrugated board and understand its far reaching grasp in the global packaging industry.
2. Understand the manufacturing process for corrugated board, container converting, and enhancement treatments.
3. Leverage the properties of corrugated board for specific packaging needs.
4. Evaluate compressive forces and headspace, and apply that knowledge to several case studies.
5. Recognize standard corrugated container styles and the design to diecutting process to obtain each style.
6. Strategize to effectively store and distribute corrugated containers.

1. Corrugated Beginnings

- 1.1. **Introduction to Corrugated** (Video, 1:33): Introduction to the topic and expectations outline
- 1.2. **What is Corrugated Board?** (Video, 8:51): General description and specification of corrugated board
- 1.3. **Evolution of Corrugated Packaging** (Interactive, 10:00): Historical overview of corrugated from starting in ancient times
- 1.4. **Corrugated Industry Overview** (Infographic, 2:00): Up-to-date, relevant, global market data
- 1.5. **Grades of Corrugated Board** (Video, 6:44): Detailed definitions of corrugated fluting design and specifications
- 1.6. **Fluting** (Video, 7:24): Description of strength and applications, flute sizes, printing qualities, and more
- 1.7. **Packaging Tape Selection Strategy** (Survey, 5:00): How to choose the correct tape considering certain variables
- 1.8. **Knowledge Check: Corrugated Beginnings** (Quiz, 3 questions): Helps retain learnings from Corrugated Beginnings

2. Corrugated Production

- 2.1. **Production** (Video, 2:26): Introduction and outline of production of corrugated
- 2.2. **Plant Types | Integrates & Independents** (Infographic, 3:00): Overview of different types of production plants
- 2.3. **Paper Making Overview** (Video, 3:19): Brief outline of the process of making paper
- 2.4. **Corrugated Manufacturing** (Video, 5:00): On site description of the corrugated process including paper, steam, and adhesive
- 2.5. **Container Converting** (Video, 5:30): Discussion of converting machines and printing
- 2.6. **Coatings & Surface Treatments** (Video, 4:09): Discussion of the moisture barrier, wax impregnation, addition of strength, and other coatings
- 2.7. **Knowledge Check: Corrugated Production** (Quiz, 4 questions): Helps retain learnings from Corrugated Production

3. Corrugated Properties and Testing

- 3.1. **Intro to Corrugated Properties & Testing** (Video, 1:37): Outline and introduction to the rest of the lesson

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- 3.2. **Physical Properties - ECT, BCT** (Video, 12:45): Outline of crush (ECT, RCT,FCT), mullen burst, puncture, compression
- 3.3. **Porosity Properties** (Video, 7:43): Properties of water, grease, water vapor, and air
- 3.4. **Surface Properties** (Video, 4:19): Discussion of all surface properties, including printing attributes
- 3.5. **Other Properties to Consider** (Presentation, 5:00): Discussion of properties including: insulation, cushioning/dunnage, honeycomb, pallets
- 3.6. **Sustainability** (Presentation, 3:00): Takes into account recycling, inks, formaldehyde, and wastewater
- 3.7. **Knowledge Check: Properties and Testing** (Quiz, 5 questions): Helps retain learnings from Properties and Testing
- 4. Performance Specifications**
 - 4.1. **Introduction to Designing for Performance Specifications** (Video, 1:30): Introduction to CS, ECT, and BCT
 - 4.2. **RSC Minimization Model** (Video, 8:20): Determines the relationship between dimensions of an RSC container to minimize materials
 - 4.3. **Headspace** (Video, 6:11): Finding optimum headspace and three product load sharing cases
 - 4.4. **Introduction to Compressive Forces** (Presentation, 4:00): Discussion of the types of strength and tools to help solve for strength
 - 4.5. **Intro to Headspace Cases** (Video, 0:37): Outline of the following three headspace cases
 - 4.6. **Headspace | Case 1** (Video, 3:01): Timelapse video and explanation of force vs. deformation taking place in Clemson University's distribution lab
 - 4.7. **Headspace | Case 2** (Video, 3:42): Package and product share compressive load
 - 4.8. **Headspace | Case 3** (Video, 2:40): Contents support all compressive loads
 - 4.9. **Let's discuss Headspace!** (Discussion, 5:00): Encourages student to think critically about how headspace will affect container designs
- 5. Container Design**
 - 5.1. **Container Design and Production Workflow** (Video, 3:50): The Packaging School takes you into Cumberland Container to watch them design and create prototypes
 - 5.2. **Standard Container Styles** (Video, 3:41): Demonstration of 9 types of corrugated container styles
 - 5.3. **International Fiberboard Case Code Catalogue** (Text, 30:00): This Code has been developed by FEFCO and ESBO as an official system to substitute long and complicated verbal descriptions of fibreboard case and packaging constructions with simple symbols internationally understood by all, regardless of language and other differences.
 - 5.4. **Structural Design Software** (Text, 3:00): Overview of software packages
 - 5.5. **Dieline Design** (Video, 3:04): Instructions for making a dieline and subsequent steps to creating a package from a dieline
 - 5.6. **Printing and Finishing** (Video, 5:47): Outline of printing and finishing techniques for corrugate
 - 5.7. **Die Cutting** (Video, 4:05): Overview of digital, standard die and die-less designs
 - 5.8. **iDirectory** (Video, 1:57): AICC member directory instructions
 - 5.9. **Knowledge Check: Container Design** (Quiz, 3 questions): Helps retain learnings from Container Design
- 6. Case Packaging and Unitization**
 - 6.1. **Introduction to Packaging & Unitization** (Video, 1:10): Brief overview of the contents of the following lesson
 - 6.2. **Packing & Sealing** (Presentation, 4:00): Lesson on the two methods of packaging and sealing: manually and mechanically

- 6.3. **Unitized Systems** (Video, 8:15): Overview of palletization, stacking, pallet sizes, slip sheets, and unit load stabilization
- 6.4. **Storage and Handling** (Presentation, 3:00): Discussion of how environment affects the storage of corrugated board
- 6.5. **Palletization Software** (Video, 3:40): There are two types of software discussed in this lesson, Cape Pack and TOPs Pro
- 6.6. **Knowledge Check: Case Packaging and Unitization** (Quiz, 3 questions): Helps retain learnings from Case Packaging and Unitization
- 7. Distribution Rules and Regulations**
 - 7.1. **Rules and Regulations** (Video, 1:40): Overview of the regulations surrounding the corrugated industry
 - 7.2. **Carrier Rules** (Video, 7:48): Laws surrounding distribution of corrugated by air, land, and sea
 - 7.3. **Government / Association Regulations** (Video, 6:00): Covers Item 222, FDA, USDA, EPA, FTC, United Nations, IATA, and Worldwide
 - 7.4. **Testing and Protocol** (Video, 6:42): Covers that testing is crucial for determining strength, protective quality, and durability for shipping
 - 7.5. **Knowledge Check: Distribution Rules and Regulations** (Quiz, 3 questions): Helps retain learnings from Distribution Rules and Regulations
- 8. Wrap Up**
 - 8.1. **Corrugated Wrap Up** (Video, 1:37): Conclusive outline of Corrugated Containers
 - 8.2. **Final Exam** (Test, 30 Questions): Questions pulled from every section of the course
 - 8.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve
- 9. Appendix**
 - 9.1. **Glossary** (Text): Terms to learn when discussing corrugated packaging
 - 9.2. **Equation Sheet** (PDF): Reference sheet for RSC Minimization, Headspace, and Compression

CPS-C04 Glass Packaging

35 Micro-Lessons, 3 hours

This course teaches you the composition of commercial glass, its manufacturing process, and how to design the correct type of glass packaging for various applications.

Learning Objectives:

1. Overview the glass market and industry throughout the years and its sustainability for the future.
2. Understand the glass manufacturing process from raw materials to final inspection.
3. Discern the pros and cons of glass vs. plastic.
4. Understand glass finishing, labeling and decorating applications.
5. Evaluate product filing methods and glass distribution.

Micro-Lessons:

1. Glass Overview

- 1.1. **Introduction to Glass** (Video, 2:06): Overview of the upcoming lessons in glass packaging
- 1.2. **Interactive History of Glass** (Interactive, 15:00): An overview of glass in packaging starting with the stone age and into present day
- 1.3. **Glass Industry Market Overview** (Infographic, 1:00): Overview of the glass industry on a global scale
- 1.4. **Glass Packaging Basics** (Video, 6:35): Outline of the various uses for glass in packaging
- 1.5. **Sustainability** (Video, 7:20): Pros and cons in the recyclability of glass
- 1.6. **Glossary** (Text): Terms to learn when discussing glass packaging

2. Glass Manufacturing

- 2.1. **Introduction to Glass Manufacturing** (Video, 2:01): Overview of how important this industry is
- 2.2. **Glass Composition** (Video, 4:00): Properties of glass, raw materials, and additives
- 2.3. **Glass Manufacturing** (Text, 15:00): In-depth explanation of how glass is made
- 2.4. **Glass Colorants** (Video, 8:20): Explanation of common and custom colors
- 2.5. **Glass Treatments** (Video, 6:21): Descriptions of surface and strengthening treatments
- 2.6. **Glass Types** (Video, 3:13): High level descriptions of the three main glass types
- 2.7. **Glass Properties** (Video, 4:00): Thermal, optical, chemical, electrical, and mechanical properties
- 2.8. **Inspections and Defects** (Text, 10:00): Details how to understand glass quality
- 2.9. **Testing Standards** (Text, 10:00): Overview of standard practices
- 2.10. **Anatomy of a Glass Bottle** (Presentation, 5:00): Interactive test of the parts that make up a glass bottle
- 2.11. **Knowledge Check: Glass Manufacturing** (Quiz, 7 questions): Helps retain learnings from Glass Manufacturing

3. Glass Container Design

- 3.1. **Introduction to Glass Container Design** (Video, 4:09): Introduces the concept of custom vs. stock containers
- 3.2. **Cheat Sheet | Glass Container Styles** (Infographic, 3:00): Reference examples of different glass styles
- 3.3. **Finishes and Closures** (Presentation, 9:00): Descriptions of different lids and caps available for glass containers
- 3.4. **Decorating and Labeling** (Video, 4:04): Overview of decorative effects, labels, and screen printing

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- 3.5. **Plastics vs. Glass** (Text, 6:00): In-depth look at the pros and cons of using plastics, which are overtaking glass in the beverage packaging industry.
- 3.6. **Glass Finish Drawings** (Text/link, 5:00): list of Finish Drawings to reference for glass package production.
- 3.7. **Lightweight Glass** (Video, 3:13): Types of lightweight glass, challenges and advantages of lightweighting, and common uses
- 3.8. **Design Innovations** (Video, 6:07): Design examples for pharmaceutical, health and beauty, beverages, food, and wine and spirits
- 3.9. **Knowledge Check: Glass Container Styles** (Quiz, 4 questions): Helps retain learnings from Glass Container Design
- 4. Procurement and Production**
 - 4.1. **Ready for Order** (Video, 1:18): Instructions for getting started on a glass packaging project
 - 4.2. **General Glass Bottle Filling Process** (Video, 6:52): Review of fill methods, measurements, and machines for glass bottles
 - 4.3. **Distribution** (Video, 3:11): Overview of the process of distributing glass and the various challenges to shipping and distribution
 - 4.4. **Glass Resource Locator** (Text/links, 5:00): Glass purchasing and ordering resources
 - 4.5. **Knowledge Check: Procurement & Production** (Quiz, 3:00): Helps retain learnings from Procurement and Production
- 5. Wrap Up**
 - 5.1. **That's a Wrap** (Video, 1:22): Conclusive outline of Glass Packaging
 - 5.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
 - 5.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C05 Metal Packaging

28 Micro-Lessons, 3 hours

Course Description: This eLearning course covers the metal packaging industry and outlines raw materials and processing. As you progress, you will learn the different types of metal applicable to packaging and go through the process of making cans and closure systems. From an applied perspective, you will see how consumers perceive metal packaging, where it makes sense in your decision-making strategy, along with real-world case studies of companies moving into or away from metal. As a takeaway, you will gain a stock container selection strategy for food, beverage, pharmaceutical, cosmetic, industrial and chemical metal packaging applications.

Learning Objectives:

1. Overview the industry for metal packaging in terms of major players and market segments.
2. Describe how metal is manufactured including the key raw materials and treatment processes.
3. Understand the consumer perceptions surrounding metal as a packaging material.
4. Identify various formats of metal packaging including aerosols, three piece cans, beverage cans, flexible packages, tubes, trays, and distribution packaging.
5. See the value metal packaging brings to the food, beverage, health and beauty, and household and industrial sectors of the industry.

1. Metal Overview

- 1.1. **Welcome to Metal Packaging** (Video, 1:13): Introduces the topics covered in this course
- 1.2. **Evolution of Metal Packaging** (Presentation, 5:00): History lesson of metal packaging through present day
- 1.3. **Industry Overview** (Infographic, 2:00): Overview of the market projection and industry leaders
- 1.4. **Metal Packaging Basics** (Presentation, 7:00): Overview of making cans, types of metal, and conversions
- 1.5. **Sustainability** (Video, 4:56): Discussion of recyclability, trends, and issues in the industry
- 1.6. **Glossary** (Text): Terms to learn when discussing metal packaging
- 1.7. **Knowledge Check: Metal Overview** (Quiz, 5 questions): Helps retain learnings from metal introduction

2. Metal Manufacturing

- 2.1. **Introduction to Metal Manufacturing** (Video, 1:27): Brief discussion on the importance of manufacturing in the metal industry
- 2.2. **Raw Materials and Refinement** (Video, 7:05): Materials and production of steel, tin, and aluminum
- 2.3. **Metal Manufacturing** (Video, 6:59): In-depth look at the entire can making process for both 2 and 3 piece cans
- 2.4. **Thermal Processing and Treatments** (Video, 6:52): Overview of treatments including coatings and enamels and discussion of corrosion
- 2.5. **Anatomy of a Can** (Infographic, 2:00): Labeled images of 2 and 3 piece cans
- 2.6. **Understanding BPA** (Text, 2:00): Info on bisphenol A and links to learn more
- 2.7. **Knowledge Check: Metal Manufacturing** (Quiz, 5 questions): Helps retain learnings from metal manufacturing

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3. Metal Containers

- 3.1. **Introduction to Metal Packaging Types** (Video, 1:07): Overview of the types of metal packaging that will be discussed in this lesson
- 3.2. **Aerosols** (Video, 7:05): Information on propellants, HCFCs, valves, and other dispensers
- 3.3. **Three Piece Cans** (Video, 1:47): Overview of manufacturing and retort processes
- 3.4. **Beverage Cans** (Video, 6:44): Informative discussion of manufacturing, recyclability, beverage market, and design innovations
- 3.5. **Flexible Materials** (Video, 6:59): In-depth look at the chemical characteristics, properties, and coatings of flexible materials
- 3.6. **Tubes and Trays** (Video, 5:07): Metal vs. plastic, formation, and processes of tubes and trays
- 3.7. **Distribution Packaging** (Presentation, 5:00): Overview of metal cans for distribution, metal drums, pallets, and shipping containers
- 3.8. **Knowledge Check: Metal Packaging Types** (Quiz, 5 questions): Helps retain learnings from Metal Containers

4. Metal Container Design

- 4.1. **Introduction to Metal Container Design** (Video, 1:13): Overview of what will be covered in this lesson
- 4.2. **Metal Closures** (Video, 10:29): Overview of the types of metal closures, how they are used, and design innovations in the industry
- 4.3. **Decorating and Labeling** (Presentation, 6:00): Discussion of preprinted labels, finishes, dye sublimation, and digital printing
- 4.4. **Specifications** (Infographic, 2:00): Tool for referencing standard can dimensions in the US
- 4.5. **Design Innovations** (Video, 5:55): Discussion of disruptive designs in multiple categories including, food and beverage, household, health and beauty, and electronics, among others
- 4.6. **Knowledge Check: Metal Container Design** (Quiz, 5 questions): Helps retain learnings from Metal Container Design

5. Industry Applications of Metal

- 5.1. **Introduction to Industry Applications of Metal Packaging** (Video, 0:36): Outline of the many applications discussed in this lesson
- 5.2. **Metal Package Design: Food** (Presentation, 4:00): Examples and inspiration of metal packaging for the food market
- 5.3. **Metal Package Design: Beverage** (Presentation, 4:00): Examples and inspiration of metal packaging for the beverage market
- 5.4. **Metal Package Design: Health and Beauty** (Presentation, 4:00): Examples and inspiration of metal packaging for the health and beauty market
- 5.5. **Metal Package Design: Household and Industrial** (Presentation, 4:00): Examples and inspiration of metal packaging for the household and industrial market
- 5.6. **Discussion** (Discussion, 20:00): Encourages students to do their own research into metal packaging applications and submit a picture and argument for how it is disruptive

6. Wrap Up

- 6.1. **That's a Wrap** (Video, 1:19): Conclusive outline of Metal Packaging
- 6.2. **Final Assessment** (Test, 30 questions): Questions pulled from every section of the course
- 6.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C06 Polymers in Packaging

44 Micro-Lessons, 5 hours

Course Description: Polymers play a big role in packaging. To be a proficient and well-rounded packaging professional, you need to be comfortable with polymers. When you are working on a project involving plastics, it's important to speak this language and bring value to the table concerning polymer selection, polymer processing, and plastic in packaging. In this course, you are going to learn about the different types of polymers, their roles, functions, pros and cons of each, and real-world applications. From this, you will understand which polymers are suitable for your specific packaging needs.

Learning Objectives:

1. Give an overview of the history of polymers, the current state of the market and industry for polymer packaging, and list some of the key stakeholders.
2. Understand polymer structure and properties, including migration from packaging to product, and evaluate the sustainability of polymers.
3. Identify the various processes for polymer manufacturing, the different packaging types, and enhancement processes used for specific applications.
4. Apply polymer knowledge to its use in adhesives, closures, distribution packaging, as well as the regulations for its use.

Micro-Lessons:

1. Polymer Overview

- 1.1. **Welcome to Polymers!** (Video, 1:18): Introduction to polymers and the content of the rest of the course
- 1.2. **History of Polymers** (Interactive, 20:00): The evolution of plastics through present day
- 1.3. **Market / Industry Overview** (Infographic, 5:00): Global market, buyers, and distributors of polymers
- 1.4. **Polymers in Packaging** (Presentation, 3:00): Overview of the types of plastic packaging
- 1.5. **Glossary** (Text): Terms to learn when discussing polymer packaging

2. Polymer Chemistry 101

- 2.1. **Introduction to Polymer Chemistry 101** (Video, 1:40): Overview of the chemical makeup of polymers
- 2.2. **Basic Concepts** (Text, 20:00): Explanation of concepts including Staudinger's Hypothesis, polymer chain structure, monomers, polyester properties, tacticity, and molecular weight and distribution
- 2.3. **Polymer Structure** (Presentation, 10:00): Structure of polymers informs a full understanding of polymer packaging
- 2.4. **Thermal Properties** (Video, 9:16): Overview of kinetic energy, temperature, heat capacity, types of test, and polymer behavior
- 2.5. **Other Properties** (Video, 6:20): Explanation of properties including Mechanical, Barrier, Surfaces and Adhesion, Optical
- 2.6. **Sustainability and Biopolymers** (Presentation, 6:00): Uses and possibilities for reusing and recycling plastics
- 2.7. **Interactions with Packaging** (Presentation, 4:00): Understanding different interactions that can occur can help keep your product safe from contamination
- 2.8. **Knowledge Check: Polymer Chemistry 101** (Quiz, 6 questions): Helps retain learnings from Polymer Chemistry 101

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3. Production

- 3.1. **Introduction to Production** (Video, 1:06): Outline of the following lesson
- 3.2. **Packaging Types** (Presentation, 5:00): Overview of rigid, semi-rigid, and flexible packaging types
- 3.3. **Molding Processes - Blow Molding, Injection Molding** (Video, 4:46): Overview of extruders, cast film, blown film, stretch and shrink wrap; and injection molding
- 3.4. **Thermoforming** (Video, 4:34): Overview of optimal temperatures, molding, filling, sealing, and trimming
- 3.5. **Converting, Laminating and Coating** (Video, 11:40): Overview of blown film cast, extrusion, hot melt coating, adhesive lamination, thermal lamination, metalization, silicon oxide coating, and alternatives
- 3.6. **Flexible Packaging Systems** (Video, 12:30): High level outline of the functions of VFFS and HFFS
- 3.7. **Thermal Analysis** (Slideshow, 5:00): generalize several analytical techniques for measuring properties of a small quantity of material as it heated, cooled, or held a constant temperature
- 3.8. **Knowledge Check: Production** (Quiz, 7 questions): Helps retain learnings from Production

4. Plastics in Packaging

- 4.1. **Introduction to Plastic in Packaging** (Video, 1:23): Overview of the following lesson
- 4.2. **Polymer Cheat Sheet** (Infographic, 3:00): Quick reference for the types of polymers
- 4.3. **Regulations** (Presentation, 10:00): Explanation of the 1938 Food, Drug, and Act; 1958 Food Additives Amendment; Use of Recycled Plastic for Food Packaging; State Laws and Regulations
- 4.4. **Adhesives** (Text, 10:00): There are various classifications of adhesion that vary due to solidification, polymer base type, solvent type, or application category.
- 4.5. **Closure Systems** (Presentation, 10:00): Overview of methods and materials, selection and design, types of closures, specialty closures, and seals
- 4.6. **Distribution Packaging** (Video, 10:19): Explanation of distribution material including foams, polystyrene, polyolefin, polyurethane, starch base, thermal insulation, polymer cushioning system, plastic drums, and plastic pallets
- 4.7. **Plastics Design** (Video, 6:44): Examples of disruptive designs in plastic packaging
- 4.8. **Knowledge Check: Plastic in Packaging** (Quiz, 5 questions): Helps retain learnings from Plastics in Packaging

5. Wrap Up

- 5.1. **That's a Wrap** (Video, 1:28): Conclusive outline of Polymers in Packaging
- 5.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
- 5.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C07 Packaging Machinery

34 Micro-Lessons, 4 hours

Course Description: This course focuses on how machinery is used in the packaging industry to produce high volumes of quality packages. These individual machines can be connected to create a packaging line. You will learn how machines are classified, proper terminology to reference machines, the role of co-packers in the industry, how the structural design of a package influences the efficiency of the line, and how you can optimize your package design and machinery to produce the most proficient packaging line.

Learning Objectives:

1. Understand the evolution of machinery and where the industry stands today.
2. Identify the levels of packaging and their effect on packaging machinery layout.
3. Give an overview of a complete packaging line and the multiple components from line loading and unloading to inspecting and case packaging.
4. Evaluate a packaging line for maximum production output and efficiency.

Micro-Lessons:

1. Introduction

- 1.1. **Introduction to Machinery** (Video, 2:18): Welcome and outline to the following course
- 1.2. **Industry Overview** (Infographic, 3:00): Information about different customizations and the largest companies in manufacturing
- 1.3. **Evolution of Technology** (Interactive, 12:00): Overview of technology starting with glass development in Ancient Egypt through the machinery in use today
- 1.4. **Glossary** (Text): Terms to learn when discussing Packaging Machinery

2. Machinery 101

- 2.1. **Why You Need to Know the Fundamentals** (Video, 1:13): Introduction to general machine type and purpose
- 2.2. **Levels of Packaging** (Presentation, 5:00): Overview of the levels including primary, secondary, tertiary- Rigid, semi-rigid, and flexible
- 2.3. **Levels of Automation** (Presentation, 3:00): Discussion and examples of fully automatic, semi-automatic, or manual automation
- 2.4. **Layout and Orientation** (Presentation, 3:00): Explanation of the differences between rotary and inline machines
- 2.5. **Speed** (Text, 5:00): Measuring speed and types of motion
- 2.6. **Knowledge Check: Machinery 101** (Quiz, 4 questions): Helps retain learnings from Machinery 101

3. The Packaging Production Line

- 3.1. **Introduction to the Packaging Production Line** (Video, 1:18): General overview of the packaging line
- 3.2. **Line Loading and Unloading** (Presentation, 8:00): How materials arrive at the plant; methods of unloading: dumping, uncasing, depalletizing, orienters and unscramblers; cleaning
- 3.3. **Container Cleaning** (Presentation, 5:00): Discussion of methods of sanitation
- 3.4. **Liquid Product Filling** (Text, 20:00): Overview of liquid volumetric fillers, liquid level fillers, and nozzle types
- 3.5. **Solid Product Filling** (Presentation, 10:00): Overview of weight based filling, volumetric filler, piece filling, and auger

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- 3.6. **Flexible Packaging** (Text, 15:00): Overview of bagging machines, wrapping and bundling machines, L-Bar sealers, stretch wrapping, folded wrapping, and splicing
- 3.7. **Form-Fill-Sealing** (Presentation, 15:00): HFFS and VFFS information with packaging examples
- 3.8. **Capping and Closing** (Presentation, 10:00): In-depth overview of capping and closing steps, orientation and feeding, application, sealing, and quality control
- 3.9. **Labeling** (Presentation, 12:00): Label types, how they are applied, and problems encountered when labeling
- 3.10. **Coding and Inline Printing** (Presentation, 10:00): Types of coders, contact coders, non-contact coders, Inline printing
- 3.11. **Inspecting** (Video, 9:01): Overview of color detection, vision inspector, coder verification, fill verification, and contaminant detection
- 3.12. **Cartoning and Case Packaging** (Video, 9:04): Overview of cartoners, tray forming, bliss cases and trays, case erection, case packing, case sealing, and wraparound case packers
- 3.13. **Conveyors** (Presentation, 13:00): Types of conveyors and what they how they are best used
- 3.14. **Thermoforming** (Presentation, 10:00): Optimal temperatures, molding, filling, sealing, and trimming
- 3.15. **Knowledge Check: The Packaging Production Line** (Quiz, 5 questions): Helps retain learnings from The Packaging Production Line
- 4. Increasing Production Efficiency**
 - 4.1. **Maximize Throughput, Achieve Good Line Ergonomics and Meet Your Timeline** (Video, 1:41): Tips for how to best achieve goals and work efficiently in the machinery industry
 - 4.2. **Changeovers** (Presentation, 8:00): Information on making changeovers operate as smoothly and quickly as possible
 - 4.3. **Creating a More Flexible Packaging Line** (Presentation, 6:00): Information on ways to improve packaging lines
 - 4.4. **Package Design and Machinability** (Video, 1:10): Discussion of designing a package with machinery in mind
- 5. Conclusion**
 - 5.1. **Machinery Wrap Up** (Video, 1:23): Conclusive outline of Packaging Machinery
 - 5.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
 - 5.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C08 Package Printing

45 Micro-Lessons, 4 hours

Course Description: With a focus on unveiling the intersection between print and packaging, this course will overview the different printing methods such as flexography, lithography, gravure, screen printing, and digital printing. You will learn how these processes impact your packaging cost and quality, as well as see the link to the graphic development workflow. Color management strategies, artwork generation, prepress workflows, plate making and going to print, colors, roll and sheet stock technical specifications, timelines, budgets, tips and tricks from industry veterans will all be covered in this course.

Learning Objectives:

1. Describe the current package printing landscape in terms of market segments.
2. Understand the print process from prepress, color theory, artwork and design to ordering.
3. Identify print methods and select the right application for a specific print job.
4. Know the most appropriate and sustainable printing methods for the various packaging substrates.

Micro-Lessons:

1. Printing Overview

- 1.1. **Welcome - Introduction to Package Printing** (Video, 1:32): Introduction to the printing course
- 1.2. **History of Printing** (Interactive, 20:00): Overview of the history of printing from hardened clay printing in China to Gutenberg's letterpress to present
- 1.3. **The State of the Industry Infographic** (Infographic, 2:00): Global printing for packaging market share by process, CAGR, and market share per country
- 1.4. **Package Printing Glossary** (Text): Terms to learn when discussing package printing

2. Printing 101

- 2.1. **Introduction to Printing 101** (Video, 1:15): Overview of the following lesson
- 2.2. **Color Theory** (Video, 8:02): Overview of color spectrum, how we see color, additive color theory, subtractive color theory, hue, value, chroma, 3 things you need to view color: light, object, & observer, and reproducing color
- 2.3. **Artwork and Design** (Video, 12:36): Line art, continuous tone images, halftone images, solid print, screen tints, gradients, process printing, screen variations/screen angles, moiré, image growth, typical DPI, and planning post press processes
- 2.4. **Ordering Process** (Text, 8:00): Researching, describing the job, preparing the design, sending to printer, and completion time
- 2.5. **Print Order Checklist** (Checklist, 1:00): Helpful tool for ordering
- 2.6. **Inks** (Video, 13:08): There are 3 Basic Components: Pigment, Vehicles/Solvents, Additives, Organic Pigments, Inorganic Pigments, Natural/Synthetic Resins, Solvents, Additives, Solvent Based, Water Based, UV Curable, and Plastisol
- 2.7. **Prepress** (Video, 7:34): Creation of design, typography, color management, trapping, registration, and proofing
- 2.8. **Knowledge Check: Printing 101** (Quiz, 7 questions): Helps retain learnings from Printing 101

3. Printing Processes

- 3.1. **Introduction to Processes** (Video, 0:47): Overview of the following lesson

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- 3.2. **Letterpress** (Text, 8:00): Overview of letter production, printing process, advantages, and limitations
 - 3.3. **Flexography** (Text, 8:00): Plate production, printing process, setups, advantages, and limitations
 - 3.4. **Lithography** (Text, 5:00): Lithographic printing is one of the most common printing techniques and can be used for everything from business cards to brochures, posters, and newspapers
 - 3.5. **Gravure / Intaglio** (Text, 5:00): The contemporary method still harkens back to its roots in copper plates and etchings, using an inverted stamp method
 - 3.6. **Screen Printing** (Text, 6:00): This is most typically used for printing textiles, garments, and outdoor marketing, but it can also be used to print electronic circuit boards, membrane switches, and faceplates for appliances
 - 3.7. **Digital Printing** (Text, 6:00): There are many types of digital printing, but in this lesson we will discuss the main types: inkjet and xerography
 - 3.8. **Combination Presses** (Text and video, 5:00): The combination of Digital and Flexo is one of the most widely used updates today
 - 3.9. **Post Press** (Video, 11:30): Overview of binding, folding, cutting, trimming, finishing, diecutting, color management, densitometer, colorimeter, spectrophotometer, hygrosopes, inkometers (ink film thickness) control targets, visual inspections; copying, reflective metallics, hot-stamp & heat-transfer printing
 - 3.10. **Selection Strategy** (Presentation, 8:00): Helpful tool to help choose the right type of printing machine
 - 3.11. **Future of Print** (Text, 7:00): Trend predictions for every type of printer
 - 3.12. **Knowledge Check: Printing Processes** (Quiz, 9 questions): Helps retain learnings from Printing Processes
- 4. Printing Packaging**
- 4.1. **Introduction to Printing Packaging** (Video, 1:13): Overview of the following lesson
 - 4.2. **General Labeling** (Video, 7:55): Types of labels, problems you may encounter, shrink labels: distortion, die cutting labels, labeling equipment, lead times
 - 4.3. **Cartons & Containers** (Video, 9:20): Overview of the printing processes of cartons and containers
 - 4.4. **Flexible Packaging Systems** (Video, 4:49): Printing processes, inks, preparations for printing, and polymer films
 - 4.5. **Metal and Glass** (Video, 6:49): Information on how to print on metal and glass
 - 4.6. **Plastic Packaging** (Video, 5:22): Printing on rigid plastic, in mold labeling, pressure sensitive labeling, shrink films, semi-rigid packaging, and flexible
 - 4.7. **Sustainability** (Checklist, 4:00): A cooperative tool to help determine the environmental profile of your printing processes
 - 4.8. **Design Inspiration** (Presentation, 8:00): Examples of disruptive packaging
 - 4.9. **Knowledge Check: Printing Packaging** (Quiz, 8 questions): Helps retain learnings from Printing Packaging
- 5. Wrap Up**
- 5.1. **That's a Wrap** (Video, 1:30): Conclusive outline of Package Printing
 - 5.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
 - 5.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C09 Sustainable Packaging

28 Micro-Lessons, 4 Hours

Course Description:

Are you looking for ways to make more sustainable decisions in your packaging line? In this course, you're going to get a solid foundation in sustainable design thinking- the tools and resources you can apply today to make better decisions right from the beginning. You will also learn ways to assess your current processes with the intent to reduce any environmental footprint you may already have. We will cover LCA, Cradle to Grave vs. Cradle to Cradle, energy sourcing, design optimization and effective recovery. Consideration of the 3Ps (people, planet and profit) are absolutely essential in crafting a convincing sustainable strategy.

Learning Objectives:

1. Define sustainability as it relates to packaging, and sort through the perceptions vs. the realities of sustainable packaging.
2. Overview sustainability across the supply chain from beginning concept to end of life or rebirth.
3. Evaluate the sustainability of standard packaging substrates and also the growing trend with alternative materials.
4. Understand the steps a company should take to assess their own environmental footprint and how to implement changes for the better.
5. Grasp guidelines and regulations established for sustainability in packaging design.
6. Relate sustainable principles to specific case studies.

Micro-Lessons:

1. Introduction

- 1.1. **Introduction to Sustainability** (Video, 1:29): Brief explanation of sustainability and an overview of the following course
- 1.2. **Defining Sustainable Packaging** (Video, 6:47): Explanation of how to define and measure sustainability
- 1.3. **Packaging and the Waste Stream** (Infographic, 3:00): The entire life cycle of the garbage we produce - from disposal or recycling to the next stages - landfilling, energy production or repurposing
- 1.4. **Perceptions and Realities of Sustainability** (Video, 9:00): Differentiating via packaging waste, recycling, and packaging realities
- 1.5. **Sustainability Orientation - Let's Get to Know Each Other!** (Discussion): Students introduce themselves and what they are hoping to get from the course

2. Frameworks

- 2.1. **Introduction to Frameworks** (Video, 2:13): Overview of the terms linear model, circular module, and cradle to grave
- 2.2. **Cradles and Graves** (Presentation, 7:00): The cradle to grave model defines the beginning and the end of the packaging system
- 2.3. **Green Engineering** (Video, 8:03): In depth discussion of the 12 principles of green engineering
- 2.4. **The Circular Economy** (Video, 7:24): Elements, design, and flow of the circular economy

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- 2.5. **Knowledge Check: Frameworks** (Quiz, 5 questions): Helps retain learnings from Frameworks
- 3. Materials**
- 3.1. **Introduction to Materials** (Video, 1:32): Overview of the materials lesson
- 3.2. **Paperboard** (Video, 2:08): Explanation of the sustainable forestry cycle
- 3.3. **Glass** (Video, 7:20): Aspects of glass recycling including cullet, benefits, challenges, and lightweighting
- 3.4. **Metal** (Video, 4:56): Factors include cradle to cradle, shrinking carbon footprints, increased shelf life, easily recycled, sustainable steel, and sustainable aluminum
- 3.5. **Plastics** (Presentation, 15:00): The impact of plastics on the environment can be minimized with proper management
- 3.6. **Printing and Inks** (Slideshow, 10:00): There are many ways to make sustainable design decisions including using less ink and choosing ink without harmful chemicals
- 3.7. **Alternative Materials** (Video, 6:48): Sustainable materials include bioplastics; cellophane; bamboo, mushroom, and sugarcane packaging; and palm and reed fiber
- 3.8. **Knowledge Check: Materials** (Quiz, 3 questions): Helps retain learnings from materials
- 4. Analysis and Reporting**
- 4.1. **Introduction to Analysis & Reporting** (Video, 1:34): Overview of the following lesson
- 4.2. **Environmental Footprint** (Video, 8:23): Policies and standards push companies to reduce environmental impact and create a sustainable footprint
- 4.3. **Analysis Software** (Text, 5:00): Analysis software tools step in to help companies see how their system affects the environment
- 4.4. **Life Cycle Analysis** (Presentation, 8:00): Measurement of the sustainability of a product or system through quantitative and objective methodologies regulated by the ISO 14040
- 4.5. **Corporate Goals and Reporting** (Text, 7:00): A look at three real companies that are trying to reduce their environmental impact
- 4.6. **Knowledge Check: Analysis & Reporting** (Quiz, 5 questions): Helps retain learnings from analysis and reporting
- 5. Design Guidelines**
- 5.1. **Introduction to Design Guidelines** (Video, 1:29): Overview of the following lesson
- 5.2. **FTC Green Guides** (Presentation, 10:00): FTC labeling guides have set specified rules and regulations for companies to meet in order to market their product as green
- 5.3. **Labeling Principles** (Presentation, 8:00): Certifications such as ISO 14020 are necessary so companies do not mislead the consumer
- 5.4. **APR Design Guide for Plastics Recyclability** (Presentation, 10:00): Includes resin codes, APR recyclability categories, and test method categories
- 5.5. **Sustainable Design Checklist** (Checklist, 15:00): A cooperative tool to help determine the environmental profile of your package
- 5.6. **Knowledge Check: Design Guidelines** (Quiz, 4 questions): Helps retain learnings from design guidelines
- 6. Case Studies**
- 6.1. **Introduction to Case Studies** (Video, 1:31): Overview of specific company case studies we will look at
- 6.2. **Value Engineering** (Video, 2:56): Timeline of Nike's shoe box design changes
- 6.3. **Biomimicry** (Video, 8:17): Vitalis water bottles mimic nature so as to be both visually appealing and consume less energy in production

- 6.4. **eCommerce** (Video, 4:55): Amazon is committed to frustration free packaging that uses less packaging material and The Honest Company has developed a lightweight, reusable solution to their household cleaning product packaging
- 6.5. **Designing for Reuse** (Video, 3:37): Heineken has developed a reusable bottle and there is a doll package that repurposes the packaging into a toy boat
- 6.6. **A Sustainable Labeling Approach** (Video, 5:23): Onsite interview with UPM Raflatac to discuss their sustainable approach

7. **Wrap Up**

- 7.1. **Apply What You've Learned** (Project, 3 questions): Answer questions to apply knowledge to real world packaging examples
- 7.2. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C10 Packaging Distribution

52 Micro-Lessons, 5 hours

Course Description:

Getting products from the point of manufacture to the customer safely is a serious task. Well designed transport packaging considers many factors: internal packaging equipment, carrier mode, transport strategy, fulfillment, inventory, and environmental factors. This e-learning course will teach you about the various types of carriers and modes of distribution. You will learn the four fundamental categories of hazards and the corresponding tests used to design packaging systems that withstand the forces of distribution. Packaging systems using wood containers, pallets, corrugated containers, and returnables are evaluated. At the end of this course, you will walk away with a complete understanding of the distribution system for both industrial and consumer packaged goods.

Learning Objectives:

1. Define the functions of transport packaging and understand transport strategy approaches (LTL, FTL, Parcel).
2. Embrace the total systems approach to distribution packaging to minimize waste, profit loss and maximize productivity.
3. Understand party logistics and general considerations for choosing a carrier and freight class.
4. Define the four fundamental categories of hazards exist in distribution: Shock, Vibration, Compression, and Atmospheric
5. Identify test methods by distribution packaging standards organizations such as ISTA & ASTM
6. Design packaging systems for the distribution environment

Micro-Lessons:

1. Distribution Overview

- 1.1. **Introduction to Distribution** (Video, 1:25): Overview of the considerations of designing a transport packaging system
- 1.2. **Defining Transport Packaging** (Text/Video, 20:00): Transport packaging is best defined by understanding a few considerations: your internal packaging equipment, the carrier mode, the transport strategy, fulfillment, inventory, and environmental factors
- 1.3. **Developing Distribution Systems** (Video, 16:07): In-depth explanation of a 10 step approach
- 1.4. **Let's Get to Know Each Other - Introduce Yourself!** (Discussion): Students introduce themselves and what they are hoping to get from the course
- 1.5. **Glossary** (Text): Terms to learn when discussing distribution packaging

2. Distribution Modes

- 2.1. **Introduction to Distribution Modes** (Video, 0:54): There are three main modes of transportation: air, land, and sea
- 2.2. **Carrier Considerations** (Video, 7:30): Considerations include scalability, standard operating procedures, and freight classes
- 2.3. **Carrier Rules & Regulations** (Video, 9:19): Each mode of transportation has its own set of regulations which suppliers and customers have to agree on

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- 2.4. **Road Transportation** (Video, 4:44): Overview of road roughness measurement and road transportation methods
- 2.5. **Rail Transportation** (Video, 6:09): Overview of the many rail transportation methods
- 2.6. **Air Transportation** (Video, 7:06): Overview of types of air transportation and unit loading device
- 2.7. **Sea Transportation** (Video, 5:38): Ocean freight is the main shipping method for international import and export
- 2.8. **Knowledge Check: Distribution Modes** (Quiz, 5 questions): Helps retain learnings from distribution modes

3. Hazards and Testing

- 3.1. **Introduction to Hazards and Testing** (Video, 1:13): Types of hazard testing include atmospheric pre-conditioning, compressive testing, drop, tilt, vibration, and vertical & horizontal shock
- 3.2. **Distribution Hazards** (Text/Video, 15:00): Distribution packaging expert, Kyle Dunno, describes potential hazards that must be taken into account when designing packaging for the distribution environment followed by an in depth look at each potential hazard
- 3.3. **Atmospheric Pre-Conditioning** (Text, 4:00): Atmospheric pre-conditioning sets a package up for the conditions it will be exposed to during transport including regulating humidity and temperature
- 3.4. **Demo | Atmospheric Pre-Conditioning** (Video, 0:55): Example video of packages undergoing atmospheric pre-conditioning with explanation by expert, Greg Batt
- 3.5. **Drop Testing** (Text, 5:00): A free fall drop test is done to simulate possible drops during transportation
- 3.6. **Demo | Drop Test** (Video, 0:57): Example video of packages undergoing drop testing with explanation by expert, Greg Batt
- 3.7. **Tilt Testing** (Text, 4:00): Tilt testing (also known as rotational edge drop testing) is useful for understanding how a package resists tipping over and reveals potential damage due to the handling environment such as the use of forklifts
- 3.8. **Demo | Tilt Testing** (Video, 0:51): Example video of packages undergoing tilt testing with explanation by expert, Greg Batt
- 3.9. **Horizontal Shock Testing** (Text, 3:00): Horizontal shock testing is used to understand the ability of a package or product to withstand laboratory simulated horizontal impact forces
- 3.10. **Demo | Horizontal Shock Testing** (Video, 0:52): Example video of packages undergoing horizontal shock testing with explanation by expert, Greg Batt
- 3.11. **Vibration Testing** (Presentation, 6:00): Explanation of the three types of vibration tests: repetitive shock, resonance by sine sweep and dwell, random vibration
- 3.12. **Demo | Vibration Testing** (Video, 1:17): Example video of packages undergoing vibration testing with explanation by expert, Greg Batt
- 3.13. **Shock Testing** (Text, 3:00): By examining the fragility of the product itself, the necessary level of protection can be fully understood, or a product redesign could be made to increase the product's integrity
- 3.14. **Demo | Shock Testing** (Video, 1:28): Example video of packages undergoing shock testing with explanation by expert, Greg Batt
- 3.15. **Compression Factors** (Text, 7:00): Compression occurs during distribution and in warehouses due to stacking
- 3.16. **Compression Testing** (Video, 4:25): Explanation of the constant load test and the dynamic load test
- 3.17. **Knowledge Check: Hazards & Testing** (Quiz, 7 questions): Helps retain learnings from hazards and testing

4. Performance Design

- 4.1. **Introduction to Performance Design** (Video, 0:56): Brief overview of the following lesson
- 4.2. **Testing Overview Introduction** (Video, 5:18): In-depth explanation given by Kyle Dunno, Director of Packaging Technology at Atlantic Packaging
- 4.3. **Testing Overview** (Text/Video, 12:00): ISTA, ASTM, MIL-SPEC, ISO, and DIN are some of the most common organizations who develop and oversee packaging testing standards
- 4.4. **Product Fragility** (Presentation, 4:00): There are two kinds of fragility: shock and vibration
- 4.5. **Cushioning Systems** (Text, 6:00): Cushioning systems are a method of providing protection for products
- 4.6. **Dunnage Options** (Video, 13:36): Overview of functions of dunnage, dunnage materials, and types of dunnage
- 4.7. **Corrosion Mitigation** (Text, 5:00): Desiccants, preservative barriers, or volatile corrosion inhibitors are necessary for most metals to ensure that the product arrives at the customer in full working condition
- 4.8. **Knowledge Check: Performance Design** (Quiz, 8 questions): Helps retain learnings from performance design

5. Packaging Systems

- 5.1. **Introduction to Packaging Systems** (Video, 1:34): Overview of the following lesson
- 5.2. **Wood Containers** (Video, 3:47): Differentiates between various box styles and explanation of how crates protect products
- 5.3. **Pallets** (Text, 6:00): Pallets are able to support upwards of 2000 pounds, and are manufactured in a number of standard sizes which make it easy to cube out standard trailer and container size
- 5.4. **Pallet Type Comparison Guide** (Infographic, 4:00): Helpful tool to quickly reference the types of pallets
- 5.5. **Corrugated Containers** (Presentation, 13:00): Discussion of the various corrugated types and common properties and quality assurance tests
- 5.6. **Returnables** (Video, 6:27): Various returnable container styles and the advantages and disadvantages of each
- 5.7. **Other Systems** (Presentation, 10:00): A look at non-traditional distribution systems including paper, wood, metal, and plastic containers
- 5.8. **Unitization** (Video, 7:48): Overview of unitizing, costs, sizing, load bases and stabilizers, and palletizing equipment
- 5.9. **Information Design for Distribution** (Text, 4:00): Symbols and phrases such as “Fragile,” up arrows to indicate proper storage, and hazard labels are all necessary to help a product safely reach the customer while barcodes are also used to ensure the package makes it through the distribution chain without getting lost
- 5.10. **UN Markings** (Infographic, 4:00): Useful tool for breaking down markings
- 5.11. **Knowledge Check: Packaging Systems** (Quiz, 8 questions): Helps retain learnings from Packaging Systems

6. Wrap Up

- 6.1. **Distribution - That's a Wrap!** (Video, 1:31): Conclusive outline of Package Printing
- 6.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
- 6.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C11 U.S. Packaging Regulations

32 Micro-Lessons, 4 hours

This course provides you with a framework for approaching packaging compliance in addition to resources of main regulatory agencies and laws shaping the current landscape.

Micro-Lessons:

1. Laws and Regulations Overview

- 1.1. **Introduction to Packaging Laws and Regulations** (Video, 1:42): Outline of the course including the fundamentals of the US Regulatory process, a framework for legal requirements, and 10 major factors to consider
- 1.2. **Framework for Legal Requirements** (Text, 3:00): Overview of Product Composition, Product Distribution, Package Materials, Structural Conditions, Labeling Requirements, Environment, Intellectual Property, Regulations, State vs. Federal Law, and Human Influence
- 1.3. **Fundamentals of the Regulatory Process** (Text, 5:00): In the United States, at a high level, Congress passes laws which are enforced through regulations developed by federal agencies
- 1.4. **Packaging Laws and Regulations Glossary** (Text): Terms to learn when discussing U.S. Laws and Regulations
- 1.5. **Knowledge Check** (Quiz, 3 questions): Helps retain learnings from Laws and Regulations overview

2. Regulatory Agencies

- 2.1. **Introduction to Regulatory Agencies** (Video, 2:10): Outline of the agencies to be discussed in this lesson
- 2.2. **USC** (Text, 6:00): U.S.C stands for United States Codes and is a consolidation and codification organized by subject matter of the general and permanent laws of the United States which is prepared by the Office of the Law Revision Counsel of the United States House of Representatives
- 2.3. **CFR** (Text/Video, 6:00): History and overview of the US Code of Federal Regulations
- 2.4. **FDA** (Presentation, 7:00): History, overview, and packaging examples related to the Food and Drug Administration
- 2.5. **USDA** (Presentation, 4:00): History, overview, and packaging examples related to the US Department of Agriculture
- 2.6. **FTC** (Presentation, 5:00): History, overview, and packaging examples related to the Federal Trade Commission
- 2.7. **EPA** (Presentation, 5:00): History, overview, and packaging examples related to the Environmental Protection Agency
- 2.8. **DOT** (Presentation, 6:00): History, overview, and packaging examples related to the Department of Transportation
- 2.9. **DOC** (Presentation, 5:00): History, overview, and packaging examples related to the Department of Commerce
- 2.10. **Department of Treasury** (Presentation, 4:00): History, overview, and packaging examples related to the Department of Treasury
- 2.11. **CPSC** (Presentation, 6:00): History, overview, and packaging examples related to the Consumer Product and Safety Commission
- 2.12. **Knowledge Check: Regulatory Agencies** (Quiz, 12 questions): Helps retain learnings from Regulatory Agencies

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3. Packaging Categories

- 3.1. **Introduction to Packaging Categories** (Video, 1:15): Overview of popular product categories and agencies and major regulations that affect package development
- 3.2. **Packaging Categories & Agencies** (Infographic, 3:00): Helpful tool to quickly reference regulatory agencies
- 3.3. **Food and Beverage** (Presentation, 12:00): Overview of the history of food and beverage regulations
- 3.4. **Meat Products** (Presentation, 10:00): Information on packaging materials, irradiation, labeling, and COOL
- 3.5. **Alcohol and Tobacco** (Text, 7:00): Packaging regulations for Alcohol and Tobacco are mainly regulated by the Alcohol and Tobacco Tax and Trade Bureau (TTB) of the Department of Treasury as well as the Food and Drug Administration FDA
- 3.6. **Toys and Children** (Presentation, 9:00): Regulations are necessary to keep children from hazards either due to packaging, or the product inside
- 3.7. **Pharmaceuticals and Cosmetics** (Text, 13:00): History and overview of these products, which are regulated by the FDA
- 3.8. **Hazardous Goods** (Presentation, 9:00): Overview of DOT Regulations, UN Packaging Group, 9 Dangerous Goods Classification, Proper labeling, 49 CFR, and packaging identification code
- 3.9. **UN Markings Download** (Infographic, 4:00): Helpful tool to understand the different markings used in packaging
- 3.10. **Knowledge Check: Packaging Categories** (Quiz, 10 questions): Helps retain learnings from packaging categories

4. Additional Legal Considerations

- 4.1. **Additional Legal Considerations** (Video, 2:12): Outline of the following lesson
- 4.2. **State vs. Federal Regulations** (Text, 5:00): Overview of the limiting of certain packaging materials by state and county
- 4.3. **Food Labeling Regulations** (Presentation, 10:00): Acts and guidelines for food labeling
- 4.4. **Regulations and Sustainability** (Presentation, 20:00): Overview of the standards put in place to protect the environment from packaging impacts
- 4.5. **Slack-Fill** (Video, 9:01): There are some instances where slack-fill is necessary to the packaging of a product. These instances are explained here
- 4.6. **Slack-Fill Case Studies** (Downloadable files, 30:00): In-depth look at legal cases brought against companies for having slack fill in their packaging
- 4.7. **Intellectual Property** (Video, 40:57): In-depth explanation of IP, why it matters, the different types, trademarks, patents, and protecting your property
- 4.8. **Knowledge Check: Additional Legal Considerations** (Quiz, 5 questions): Helps retain learnings from Additional Legal Considerations

5. Conclusion

- 5.1. **Wrap Up** (Video, 1:25): Conclusive outline of Laws and Regulations
- 5.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
- 5.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

CPS-C12 Packaging Design Workflow

44 Micro-Lessons, 5 hours

This course enables you to achieve the skills needed to tackle any packaging design project from forming your team to conception of ideas, research, refinement, and ultimately bringing the package to life.

1. Introduction

- 1.1. **Introduction to Packaging Design Workflow** (Video, 1:31): Outline of what will be covered in this course: comprehensive style guide, project kickoff, and design criteria
- 1.2. **History of Packaging Design** (Interactive, 15:00): Timeline of packaging starting at the beginning of human civilization and continuing through present day
- 1.3. **Professional Roles and Functions** (Video, 7:24): Description of stakeholders in packaging in terms of development
- 1.4. **Package Design Workflow Overview** (Video, 4:02): Explanation of the steps of designing a package
- 1.5. **The Packaging School's Design Workflow** (Downloadable file, 5:00): This Package Design Workflow PDF is used to guide your own packaging design projects
- 1.6. **Design Terminology** (Text): Terms to learn when discussing Packaging Design

2. Branding Basics

- 2.1. **Introduction to Branding Basics** (Video, 2:00): This section covers the basics of branding, how a brand is protected, color theory, typography, brand guidelines, and style guides
- 2.2. **Trademark and Copyright** (Text, 4:00): Information on how to register for trademarks and copyrights
- 2.3. **Color Theory and Symbolism** (Video, 18:46): Overview of color theory, color psychology, balancing colors, and tools
- 2.4. **Typography** (Presentation, 15:00): Typography is more than just font, it includes all aspects of letter art and technique of arrangement
- 2.5. **Brand Development Lab** (Presentation, 7:00): The creation of a brand through logos, colors, fonts, and other important components
- 2.6. **Style Guide Lab** (Presentation, 10:00): Creation of a style guide for your brand so that it will be consistent wherever your organization is represented
- 2.7. **Bonus Material Download: BIG Brand Style Guides** (Downloadable files, 5:00): Example of style guides used by big brands Walmart and Cabella

3. Starting a Project

- 3.1. **Introduction to Starting a Project** (Video, 1:35): Introduction to requesting proposals, project management, and project timelines
- 3.2. **New Package Development Responsibilities & Timeline** (Infographic, 5:00): Helpful tool to reference when starting a design project
- 3.3. **Team Building** (Video, 9:47): Overview of how to put together a design team and assigning roles to work together efficiently
- 3.4. **RFPs and Proposals** (Presentation, 10:00): Explains scope, timelines, and budget in order to put together a comprehensive request for proposal and proposal
- 3.5. **How to Create a Package Design Brief** (Presentation, 7:00): Design briefs put together clear instructions from the client so that designers can work creatively and efficiently

- 3.6. **Supply and Distribution Chain Maps** (Presentation, 8:00): Overview of stakeholders, knowledge, creating a map, and includes some examples
- 3.7. **Package Design Brief** (Downloadable file, 8:00): Helpful example to help model your own design brief
- 3.8. **Packaging Design Research** (Presentation, 15:00): Overview of primary and secondary research as well as how to find research resources
- 3.9. **Category Audit & PoG** (10:00): Overview of how to use these tools to better understand the physical space your packaging design will occupy
- 4. Package Development**
 - 4.1. **Introduction to Package Development** (Video, 1:06): Overview of the following lesson
 - 4.2. **Fundamental Principles of Design** (Video, 3:13): Includes balance, contrast, value, weight, position, alignment, texture, and hierarchy
 - 4.3. **Materials and Structure Workshop** (Presentation, 10:00): 4-step workshop to help you consider how various structures and materials can be used to create your packaging system
 - 4.4. **Prep Lab: Creative Thinking & Brainstorming** (Presentation, 13:00): Includes a TED talk and actionable items
 - 4.5. **Creative Thinking Brainstorming** (Video, 17:08): Examples of how some well known creators approached creative thinking and some techniques to becoming inspired
 - 4.6. **Ideation Selection** (Video, 6:06): Explanation of the 100 ideas approach to help your brain get moving and start narrowing down packaging designs
 - 4.7. **Ideation Selection Template** (Downloadable file, 5:00): Helpful tool to help you narrow down your design ideas from 100 to your top 3
 - 4.8. **Primary Display Panel** (Video, 7:11): Researched examples proving how brands catch the attention of consumers
 - 4.9. **Visual Design Workshop** (Presentation, 5:00): Actionable items for creating your visual design
 - 4.10. **Discussion: How do you brainstorm?** (Discussion, 5:00): Interactive place for students to share their organization's approach to brainstorming
- 5. Design Refinement**
 - 5.1. **Introduction to Design Refinement** (Video, 1:28): Outline of the following lesson, including the importance of research, aligning with your target audience, and qualitative & quantitative research methods
 - 5.2. **Prototyping Your Packaging** (Video, 7:35): In-depth overview of the steps for getting a prototype made and the software necessary
 - 5.3. **Making a Digital Comp** (Video, 1:04): There are 5 aspects that will inform your digital comp: substrate, size, layout, shape, and geometry
 - 5.4. **Digital Comp Softwares** (Link, 5:00): List of popular software for creating a digital comp. Take a few minutes to explore these options
 - 5.5. **Sustainability Considerations** (Infographic, 5:00): Helpful tool to help you create more sustainable designs
 - 5.6. **Survey Basics** (Infographic, 4:00): Quick reference tool to help you gather meaningful data
 - 5.7. **6 Steps to a Good Questionnaire Design** (Infographic, 3:00): Quick reference tool to help you gather the correct demographic
 - 5.8. **Eye Tracking 101** (Video, 10:19): In-depth overview of the method of eye-tracking and all its various uses
- 6. Production Prep**
 - 6.1. **Introduction to Production Prep** (Video, 1:55): Fundamental production goals are: preserve design quality, leverage the proper technology, adhere to the project timeline, limit production

costs and stay on budget, maintain sustainability of packaging materials and manufacturing processes

6.2. **Specifications and Production Comps** (Video, 7:41): Outline of how to communicate these terms

6.3. **Planning for Production** (Video, 11:44): List of goals and technology considerations before you begin production

6.4. **Preflight Checklist** (Infographic, 3:00): Helpful reference to keep you from forgetting anything

7. **Wrap Up**

7.1. **That's a Wrap!** (Video, 3:35): Conclusive outline of Package Design Workflow

7.2. **Assessment** (Test, 30 questions): Questions pulled from every section of the course

7.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

ISBT-IO1 Fundamentals of Beverage Technology

58 Micro-Lessons, 2.5 Hours

Instructor: ISBT Beverage Institute

The ISBT Beverage Institute™ is designed to provide an important resource for the global community of beverage professionals. The sessions, given by experienced beverage professionals, provide overviews as well as in-depth discussions on key topics in the art and science of beverage production. The Fundamentals of Beverage Technology course is a self-paced, interactive session providing a technical overview of the beverage industry. It covers the complete supply chain from research and development to ingredients, processing, packaging, and food safety to finished goods distribution.

Micro-Lessons:

1. Beverage Industry Overview

- 1.1. **Welcome!** (Video, 2:34): Brief overview of the beverage industry
- 1.2. **How to Navigate the Learning Platform** (Video, 2:41): Instructions for navigating this online course
- 1.3. **History of Beverages** (Interactive, 10:00): Overview of the beverage industry starting in the 18th century and through present day
- 1.4. **An Overview of the Beverage Market** (Video, 6:26): Includes topics such as: categorization of beverages, global beverage market, shifting beverage landscape, food and beverage companies, and private label packaging trends
- 1.5. **How to Get Beverages to the Market** (Video, 10:52): Includes topics such as: beverage supply chain, beverage franchise system, product research and development, ingredients, processing, packaging, distribution, fountain, and food safety
- 1.6. **A Peek into the Future** (Video, 12:01): Includes topics such as: evolution of beverage choices, industry growth, what's in store, packaging innovation, global packaging mix, beverage segments, and beverage dispensing systems innovation
- 1.7. **Let's Get to Know Each Other!** (Discussion, 5:00): Introduce yourself and what you're hoping to learn from this course

2. Introduction to Product R&D

- 2.1. **Welcome to Introduction to Product R&D** (Video, 1:08): Overview of product development given by Sally Potter, Director of Education
- 2.2. **Defining Product Development** (Text, 5:00): Product Development is a discipline involved with the chemical, physical, and biological properties of foods or beverages as it relates to its safety and quality, processing, stability, nutritional value, legality, convenience, and wholesomeness
- 2.3. **Product Development Process** (Video, 14:11): Includes sections on ideation and creative thinking, raw material availability and safety, stable and legal product formulation, consumer touch points, processing and commercialization, and quality & supply chain
- 2.4. **Knowledge Check: Introduction to Product R&D** (Quiz, 4 questions): Helps retain learnings from Product R&D

3. Introduction to Beverage Ingredients

- 3.1. **Welcome to Introduction to Beverage Ingredients** (Video, 1:58): What goes into your beverages? explained by Sally Potter, Director of Education
- 3.2. **Types of Beverages** (Infographic, 3:00): Explanation of types of beverages

- 3.3. **Ingredients in Beverages** (Text, 5:00): Ingredient statements all follow the same pattern; they begin with the highest contributing ingredient and work down in descending order
- 3.4. **Four Categories of Ingredients** (Video, 22:06): Overview of all the types of ingredients and how they appeal to consumers
- 3.5. **Ingredient Interactions** (Text, 3:00): Explanation of some of the reactions that can happen when you combine certain ingredients
- 3.6. **Beverage Formulation Reference Guide** (Infographic, 5:00): Example of how to build a beverage
- 3.7. **Knowledge Check: Introduction to Beverage Ingredients** (Quiz, 5 questions): Helps retain learnings from Beverage Ingredients
- 4. Introduction to Beverage Processing**
 - 4.1. **Welcome to Introduction to Beverage Processing** (Video, 1:05): How are your beverages developed? explained by Sally Potter, Director of Education
 - 4.2. **Beverage Processing Basics** (Text, 2:00): The three main types of beverage preservation in processing are: Thermal, Non-Thermal, Chemical
 - 4.3. **Raw Material Handling** (Video, 6:25): Process of handling materials with examples from different parts of the industry
 - 4.4. **Beverage Processing Flow Chart** (Video, 1:08): high level perspective of the flow of beverage processing
 - 4.5. **Beverage Processing Flow Chart PDF** (Infographic, 2:00): Reference tool from the previous video
 - 4.6. **Types of Filling Processes** (Video, 7:02): The types covered in this lesson are aseptic, retort, hot-fill, warm-fill, cold-fill
 - 4.7. **Processes Reference Guide** (Infographic, 3:00): Tool for quickly references for various ingredients
 - 4.8. **Equipment** (Text, 7:00): brief discussion of filling equipment, capping, labeling, and heat exchangers
 - 4.9. **Knowledge Check: Introduction to Beverage Processing** (Quiz, 5 questions): Helps retain learnings from Beverage Processing
- 5. Introduction to Beverage Packaging**
 - 5.1. **Welcome to Introduction to Beverage Packaging** (Video, 1:21): Which package is right for your product? explained by Sally Potter, Director of Education
 - 5.2. **Why Beverage Packaging Matters** (Text, 3:00): Beverage packaging serves many purposes including protection, marketability, convenience, and communication
 - 5.3. **Bird's Eye View of the Beverage Packaging Landscape** (Text, 6:00): This gives you an idea of what the beverage packaging material landscape looks like currently, but things are always evolving as technology improves
 - 5.4. **Beverage Packaging Trends** (Text, 5:00): Current state of the industry
 - 5.5. **Key Beverage Packaging Types** (Text, 2:00): PET, aluminum cans, and glass bottles
 - 5.6. **Key Beverage Packaging Types: PET** (Video, 4:05): Overview of manufacturing a plastic bottle
 - 5.7. **Key Beverage Packaging Types: Aluminum Cans** (Video, 3:26): Overview of manufacturing a can
 - 5.8. **Key Beverage Packaging Types: Glass, Closures, Aseptic and BIB** (Video, 5:09): Overview of manufacturing a glass bottle
 - 5.9. **Labeling** (Text, 2:00): There are three different types of labels pressure Sensitive, heat shrink, stretch sleeves
 - 5.10. **Knowledge Check: Introduction to Beverage Packaging** (Quiz, 5 questions): Helps retain learnings from Beverage Packaging
- 6. Introduction to Finished Goods Distribution**
 - 6.1. **Welcome to Introduction to Finished Goods Distribution** (Video, 1:41): How do we reach the consumer? explained by Sally Potter, Director of Education

- 6.2. **Beverage Transport Modes** (Video, 4:36): In-depth look at distribution by air, land, and sea
 - 6.3. **Beverage Portfolio Expansion and Packaging Considerations** (Video, 3:37): In-depth overview of the various different packaging for the same type of substance and what to consider when choosing new packaging
 - 6.4. **Transport Planning & Sourcing** (Text, 6:00): The planning process has grown increasingly complex as the beverage industry has undergone dramatic changes in recent years
 - 6.5. **Food Safety in Transport** (Text, 7:00): Cross contamination, sabotage, and temperature abuse are just a few of the potential hazards that can occur during transport
 - 6.6. **Preliminary Container Load Inspection Checklist** (Checklist, 5:00): Helpful tool to reference when making load inspections
 - 6.7. **Knowledge Check: Introduction to Finished Goods Distribution** (Quiz, 5 questions): Helps retain learnings from Finished Goods Distribution
- 7. Introduction to Fountain Beverages**
- 7.1. **Welcome to Introduction to Fountain Beverages** (Video, 1:31): Explanation of what types of equipment are considered fountains and post mix equipment
 - 7.2. **Fountain Beverages: Past-Present** (Text, 3:00): History and common forms of fountain drinks
 - 7.3. **Fountain Equipment** (Video, 7:43): Discussion of the types of dispensers: premix and post-mix
 - 7.4. **Important Factors for Fountain Beverage Quality** (Text, 8:00): Proper setup, installation, and routine maintenance all play important roles in delivering a quality drink to the consumer
 - 7.5. **Future of Fountain** (Text, 6:00): New trends in beverage fountains include: hot drinks, un-preserved products, functional and pharmaceutical, and new gases
 - 7.6. **Knowledge Check: Introduction to Fountain Beverages** (Quiz, 5 questions): Helps retain learnings from Introduction to Fountain Beverages
- 8. Introduction to Food Safety**
- 8.1. **Welcome to Introduction to Food Safety** (Video, 1:27): Avoiding Product Contamination explained by Sally Potter, Director of Education
 - 8.2. **Defining Food Safety** (Text, 2:00): The topic of food safety has many facets including: maintaining a quality ingredient, protecting it from contaminants, both intentional and unintentional, meeting the requirements outlined by the FSMA
 - 8.3. **Components of a Food Safety Plan** (Video, 4:31): Explanation of hazard analysis, preventative controls, monitoring, corrective actions, verification, record keeping
 - 8.4. **Regulatory Agencies** (Video, 9:09): Overview of U.S. Department of Homeland Security, U.S. Customs and Border Protection, and the Food and Drug Administration
 - 8.5. **Knowledge Check: Introduction to Food Safety** (Quiz, 5 questions): Helps retain learnings from Introduction to Food Safety
- 9. Conclusion**
- 9.1. **That's a Wrap** (Video, 1:35): Conclusive outline of Fundamentals of Beverage Technology
 - 9.2. **Final Exam** (Test, 30 questions): Questions pulled from every section of the course
 - 9.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

ELEC-E02 SolidWorks Basics

243 Micro-Lessons, 40 Hours

The Packaging School offers a comprehensive introduction to the Solidworks program. This is a university-structured course centered around using Solidworks to develop and design packaging systems. The objective of this course is to bring practice and application to the fundamental tools of Solidworks, within the context of packaging.

1. Introduction to Solidworks

- 1.1. **Welcome to Solidworks** (Video, 1:30): Introduction to what students are expected to learn in the course
- 1.2. **Introduction to CAD Think** (Video, 17:36): Overview of the different aspects of Computer Aided Design
- 1.3. **Interface** (Video, 4:29): Explanation of the blank screen for constructing a part design
- 1.4. **View Manipulation** (Video, 3:39): Tool for zooming in and out and rotating the part
- 1.5. **Task Pane** (Video, 2:59): Window with supplementary resources for building parts
- 1.6. **3 Concepts** (Video, 9:27): Explanation of extrusion, sweeping, and revolving
- 1.7. **Computer Test: 3D PDF** (Downloadable file, 5:00): 3D PDFs are the best way to present your Solidworks files, as most people do not have access to a full copy of Solidworks
- 1.8. **How to Create 3D PDFs** (Text, 3:00): Directions to create a 3D PDF in Solidworks
- 1.9. **How to Create ZIP Files** (Text, 5:00): Instructions for transferring large numbers of files together
- 1.10. **Introduction to Solidworks** (Text, 3:00): Directions for navigating the software
- 1.11. **Practice** (Assignment, 5:00): Open up Solidworks and use the sketching tools to draw your name on the front plane
- 1.12. **Practice Assessment** (Assignment, 5:00): Sketch your first and last name in solidworks by only using lines and arcs
- 1.13. **Online CAD resources** (Text, 3:00): Listing of great resources to leverage throughout your quest in 3D modeling
- 1.14. **Practice Quiz** (Quiz, 3 questions): Helps retain learnings from Introduction to Solidworks
- 1.15. **Survey Week 1** (Survey): Collects student responses to help The Packaging School continue to improve

2. Sketching

- 2.1. **Sketching Introduction** (Video, 0:47): Introduction to the following lesson
- 2.2. **Getting Started Sketching** (Video, 3:31): The most basic concept to understanding Solidworks
- 2.3. **Line Tool** (Video, 4:02): Sketch tool, explanation of use
- 2.4. **Rectangle Tool** (Video, 2:35): Instructions for using this sketch tool
- 2.5. **Circles and Arcs** (Video, 4:53): 2 important sketch tools and instructions for use
- 2.6. **Automatic Sketch Relations** (Video, 4:52): Method for users to manipulate the geometry of their sketches by controlling how lines behave
- 2.7. **Manual Geometric Relations** (Video, 5:43): Explanation of tools to manipulate lines
- 2.8. **Dimensions** (Video, 7:08): Capability to define the size of the sketch geometry
- 2.9. **Sketch Fillets** (Video, 3:40): Tool for rounding corners
- 2.10. **Mirror Tool** (Video, 2:21): Tool for designing symmetrical sketches
- 2.11. **Offset Entities** (Video, 2:12): Reproduces geometry but offsets it by a certain distance
- 2.12. **Trim Tool** (Video, 2:23): Instructions for using this tool

- 2.13. **Convert Entities** (Video, 3:02): Duplicates entities to different locations
 - 2.14. **Sketch on Faces** (Video, 2:36): Creates geometry on the faces of existing geometry
 - 2.15. **Circular Sketch Pattern** (Video, 5:01): Instructions for using this tool
 - 2.16. **Linear Sketch Pattern** (Video, 3:35): Duplicates geometry in a short amount of time
 - 2.17. **Linear Pattern Tool** (Video, 2:43): Patterns 3D geometry
 - 2.18. **Power User Sketching Methods** (Video, 3:26): Time-saving tool
 - 2.19. **Lesson: Design of Corrugated Box and Divider** (Text, 8:00): Step-by-step instructions for designing this object
 - 2.20. **Assignment: Design of a Corrugated Box and Divider** (Text, 20:00): Design your own box and divider with 9 partitions instead of 12 as we saw in the lesson
 - 2.21. **Check: Design of a Corrugated Box and Divider** (Files, 10:00): Resources to check your work
 - 2.22. **Need More Practice?** (Text, 15:00): Extra assignments to practice sketching
 - 2.23. **Practice Assessment** (Assignment, 10:00): Sketch a pair of tiger paws in Solidworks, and then click 'extrude' to create a 3D form
 - 2.24. **Quiz: Sketching** (Quiz, 5 questions): Helps retain learnings from Sketching
 - 2.25. **Survey Week 2** (Survey): Collects student responses to help The Packaging School continue to improve
- 3. Sketched Features and Parts**
- 3.1. **Introduction to Sketched Features and Parts** (Video, 0:46): Introduction to the following lesson
 - 3.2. **Extrude Boss** (Video, 1:15): Method of using 2-dimensional geometry to create a 3-dimensional part
 - 3.3. **Contours and Thin Feature** (Video, 3:37): Selection of particular portions of a sketch
 - 3.4. **Extrude Cut** (Video, 2:35): Deletes material instead of creating it
 - 3.5. **Revolved Boss** (Video, 2:28): Provides users with ability to use a 2D geometry profile to construct a 3D part by revolving the profile around a center line
 - 3.6. **Revolved Cut** (Video, 1:31): End product is a subtraction of solid material
 - 3.7. **Sweep** (Video, 5:05): Uses 2 independent sketch entities to construct a solid geometry
 - 3.8. **Loft** (Video, 5:22): Creates a transition among geometry with different cross sectional shapes
 - 3.9. **Editing Parts** (Video, 3:57): Instructions for making changes to parts
 - 3.10. **Appearance Callout** (Video, 5:03): Manipulation of the appearance of parts in 3D environment
 - 3.11. **FeatureSuppressions** (Video, 1:34): Conceal a feature in a part
 - 3.12. **Parent Child Relationships** (Video, 4:18): Explanation of the relationships between the steps of sketching
 - 3.13. **Mass Properties** (Video, 2:26): Solidworks automatically calculates mass, density, volume, surface area, center of mass, and moments of inertia
 - 3.14. **Lesson: Cushion Design for a Printer** (Text, 20:00): Step-by-step instructions for designing this object
 - 3.15. **Assignment: Create a Cushioning System for a Cell Phone** (Text, 20:00): Design your own cushion system
 - 3.16. **Check: Create a Cushioning System for a Cell Phone** (Files, 10:00): Resources to check your work
 - 3.17. **Need More Practice?** (Text, 15:00): Extra assignments to practice sketch features and parts
 - 3.18. **Practice Assessment** (Assignment, 10:00): Replicate the following drawing into a 3d part file
 - 3.19. **Quiz: Sketched Features and Parts** (Quiz, 4 questions): Helps retain learnings from this lesson
 - 3.20. **Survey Week 3** (Survey): Collects student responses to help The Packaging School continue to improve
- 4. Applied Features**
- 4.1. **Introduction to Applied Features** (Video, 0:57): Introduction to the following lesson

- 4.2. **Fillet** (Video, 3:41): Tool for rounding corners
- 4.3. **Chamfer** (Video, 3:42): Replace sharp edges with angled faces
- 4.4. **Shell** (Video, 3:21): Hollows out a 3D features
- 4.5. **Mirror** (Video, 1:58): Tool for designing symmetrical designs
- 4.6. **Mirror Bodies** (Video, 1:11): Faces used as references to mirror
- 4.7. **Reference Planes** (Video, 3:31): Building reference planes with different orientations within standard planes
- 4.8. **Circular Pattern Tool** (Video, 2:40): Uses different property parameters to pattern 3D geometry instead of 2D sketches
- 4.9. **Curve Driven Patterns** (Video, 2:55): Patterns extrusion along the curve of a specific component
- 4.10. **Axes** (Video, 2:44): Tool for constructing circular geometry
- 4.11. **Planes** (Video, 6:32): Discussion of different types of planes
- 4.12. **Wrap** (Video, 3:15): Allows you to place sketches on curved planes
- 4.13. **Replicating Features** (Video, 2:11): Review of mirroring features
- 4.14. **Lesson: Design of a Product in a Blister Pack** (Text, 20:00): Step-by-step instructions for designing this object
- 4.15. **Assignment: Design of a Product in a Blister Pack** (Text, 20:00): use the skills you learned in the lesson to design your own product in a blister pack
- 4.16. **Check: Design of a Product in a Blister Pack** (Files, 10:00): Resources to check your work
- 4.17. **Lesson: Design of a Gift Box** (Text, 20:00): Step-by-step instructions for designing this object
- 4.18. **Assignment: Design of a Salad Container** (Text, 20:00): Use the lesson above to design your own take-home salad box with window
- 4.19. **Check: Design of a Salad Container** (Files, 10:00): Resources to check your work
- 4.20. **Need More Practice?** (Text, 15:00): Extra assignments to practice Applied Features
- 4.21. **Practice Assessment** (Assignment, 10:00): Replicate the following file into a 3d part file
- 4.22. **Quiz: Applied Features** (Quiz, 3 questions): Helps retain learnings from this lesson
- 4.23. **Survey Week 4** (Survey): Collects student responses to help The Packaging School continue to improve

5. Assemblies

- 5.1. **Introduction to Assemblies** (Video, 0:41): Introduces the following lesson
- 5.2. **Starting an Assembly** (Video, 1:20): Steps to create a new assembly from parts you've already made
- 5.3. **Inserting Components** (Video, 1:38): Covers basic components
- 5.4. **Positioning Parts** (Video, 6:07): Move tool and rotate tool
- 5.5. **Exploded Views** (Video, 2:50): Shows all the parts involved in an assembly to show how assembly is made
- 5.6. **Intro to Mates** (Video, 2:41): Defines where your part sits
- 5.7. **Mating Parts** (Video, 2:41): Explanation of different types of mates
- 5.8. **Smart Mates** (Video, 3:05): Convenient for mating many objects at once
- 5.9. **Interface Detection** (Video, 2:06): Keeps parts from interfering with each other
- 5.10. **Collision Detection** (Video, 1:12): Makes sure moving parts won't collide with each other
- 5.11. **Lesson: Assembly Drawing of an Exploded Shipping Package** (Text, 20:00): Step-by-step instructions for designing this object
- 5.12. **Assignment: Assembly Drawing of the Exploded Shipping Package** (Text, 20:00): Use the box and divider you designed in the Sketching lesson to create an assembly drawing of an exploded shipping package with 9 partitions instead of 12 as we saw in the lesson

- 5.13. **Check: Assembly Drawing of the Exploded Shipping Package** (Files, 10:00): Resources to check your work
- 5.14. **Lesson: Product in the Clamshell Package** (Text, 20:00): Step-by-step instructions for designing this object
- 5.15. **Assignment: Clamshell Jewelry Box** (Text, 20:00): use what you learned in the lesson to design a clamshell ring box
- 5.16. **Check: Clamshell Jewelry Box** (Files, 10:00): Resources to check your work
- 5.17. **Lesson: Assembly of the Corrugated Box and Bottle** (Text, 20:00): Step-by-step instructions for designing this object
- 5.18. **Assignment: Assembly of the Corrugated Box and Jar** (Text, 20:00): assemble your own corrugated box and jar
- 5.19. **Check: Assembly of the Corrugated Box and Jar** (Files, 10:00): Resources to check your work
- 5.20. **Need More Practice?** (Text, 15:00): Extra assignments to practice Assemblies
- 5.21. **Quiz: Assemblies** (Quiz, 3 questions): Helps retain learnings from this lesson
- 5.22. **Survey Week 5** (Survey): Collects student responses to help The Packaging School continue to improve

6. Drawings

- 6.1. **Introduction to Drawings** (Video, 0:25): Introduction to the following lesson
- 6.2. **Intro to Drawings** (Video, 3:25): 2D sketches used after making parts and assemblies
- 6.3. **Model Views** (Video, 5:24): Instructions for turning model view into a drawing
- 6.4. **Section Views** (Video, 3:48): Allows a piece to be cut in half to view the inside
- 6.5. **Detail View** (Video, 2:01): Shows more detail in your drawing
- 6.6. **Bill of Material** (Video, 1:28): Displays part name, description, and quantity
- 6.7. **Adding Balloons** (Video, 2:15): Indicate where items are located in an assembly
- 6.8. **Drawing Dimensions** (Video, 1:20): Shows size requirements for the part created in Solidworks
- 6.9. **Lesson: Drawing for the Cushion Foam** (Text, 20:00): Step-by-step instructions for designing this object
- 6.10. **Assignment: Drawing for the Cushion Foam** (Text, 20:00): Create a drawing of the iPhone cushion foam based on your design from the assignment in Sketched Features and Parts
- 6.11. **Check: Drawing for the Cushion Foam** (Files, 10:00): Resources to check your work
- 6.12. **Need More Practice?** (Text, 15:00): Extra assignments to practice Drawings
- 6.13. **Quiz: Drawings** (Quiz, 4 questions): Helps retain learnings from this lesson
- 6.14. **Survey Week 6** (Survey): Collects student responses to help The Packaging School continue to improve

7. Advanced Sketching

- 7.1. **Introduction to Advanced Sketching** (Video, 0:45): Introduction to the following course
- 7.2. **Ellipses** (Video, 3:34): Directions for using tool to create ellipses
- 7.3. **Polygons** (Video, 1:03): Directions for using tool to create polygons
- 7.4. **Parabolas** (Video, 2:35): Directions for using tool to create parabolas
- 7.5. **Splitting Entities** (Video, 1:04): Allows you to make trims without having any geometry
- 7.6. **Helixes and Spirals** (Video, 1:36): Directions for using tool to create helixes and spirals
- 7.7. **Curves through x, y, and z points** (Video, 2:23): Allows creation of data or importing data of exacting and specific curves for a project
- 7.8. **Curves - Composite** (Video, 1:11): Turns 2 sketches into 1
- 7.9. **Curves through Reference Points** (Video, 0:58): Allows drawing many points on a sketch to follow with the curves function
- 7.10. **Curves - Projected** (Video, 1:32): Project sketches onto a face or another sketch

- 7.11. **Curves - Intersection** (Video, 1:39): Created through the sketch toolbar
 - 7.12. **Derived Sketches** (Video, 1:55): Copy & Paste feature that allows you to make changes to both sketches at once
 - 7.13. **Sketching Relations** (Video, 3:29): More basics of 3D sketching
 - 7.14. **Intro to 3D Sketching** (Video, 3:44): Allows creation of intricate objects in a single sketch
 - 7.15. **3D Sketching with Planes** (Video, 5:18): Directions for sketching at an angle
 - 7.16. **3D Sketching Planes** (Video, 3:40): How to add 3D planes as you're creating a sketch
 - 7.17. **Lesson: Design of an Apple Tray** (Text, 20:00): Step-by-step instructions for designing this object
 - 7.18. **Assignment: Design of an Egg Carton** (Text, 20:00): Use the lesson above to sketch your own egg carton
 - 7.19. **Check: Design of an Egg Carton** (Files, 10:00): Resources to check your work
 - 7.20. **Need More Practice?** (Text, 15:00): Extra assignments to practice advanced sketching
 - 7.21. **Practice Assessment** (Assignment, 10:00): Create a detailed, and unique backpack as one solid part
 - 7.22. **Quiz: Advanced Sketching** (Quiz, 3 questions): Helps retain learnings from this lesson
 - 7.23. **Survey Week 7** (Survey): Collects student responses to help The Packaging School continue to improve
- 8. Advanced Sweeping**
- 8.1. **Introduction to Advanced Sweeping** (Video, 0:22): Introduces the following lesson
 - 8.2. **Path Options** (Video, 2:18): Advanced features of the sweep function
 - 8.3. **Guide Curves** (Video, 3:00): Manipulates material as it proceeds along a path
 - 8.4. **Multiple Guide Curves** (Video, 1:12): Guide curves located on different sketches
 - 8.5. **Profile Orientation** (Video, 2:47): Another way to manipulate sweeps
 - 8.6. **Twists** (Video, 1:14): Instructions for adding twists to sweeps
 - 8.7. **Swept Cut** (Video, 1:43): Allows you to cut along a path
 - 8.8. **Threads** (Video, 12:08): Instructions for this 3-step process
 - 8.9. **Need More Practice?** (Text, 15:00): Extra assignments to practice advanced sweeping
- 9. Advanced Lofting**
- 9.1. **Introduction to Advanced Lofting** (Video, 0:19:): Introduces the following lesson
 - 9.2. **Closing a Loft** (Video, 1:15:): Allows you to create a fully enclosed lofted sketch
 - 9.3. **Controlling Loft Points** (Video, 3:39): Profile geometry when lofting between items with different numbers of points
 - 9.4. **Loft Profiles** (Video, 2:43): Using different features as lofting profiles to create an object
 - 9.5. **Start and End Constraints** (Video, 3:13): Changes loft appearances
 - 9.6. **Guide Curves** (Video, 2:23): Changes the curve of the feature
 - 9.7. **Centerlines** (Video, 2:48): Guides the entire part instead of a selected line
 - 9.8. **Adding Sections** (Video, 3:06): Allows you to control how your loft looks as it's lofted along different profiles
 - 9.9. **Cutting with a Loft** (Video, 0:45): Explanation for removing material with the loft tool
 - 9.10. **Assignment: Design of a bottle and handle** (Text, 20:00): use what you learned in the sweeping and lofting sections to create a bottle with a handle similar to the picture shown
 - 9.11. **Need More Practice?** (Text, 15:00): Extra assignments to practice advanced lofting
 - 9.12. **Practice Assessment** (Assignment, 10:00): Using sweeps and lofts as your primary design mechanism, design a new vacuum cleaner
 - 9.13. **Quiz: Advanced Lofting** (Quiz, 4 questions): Helps retain learnings from this lesson
 - 9.14. **Survey Week 9** (Survey): Collects student responses to help The Packaging School continue to improve

10. Advanced Features

- 10.1. **Introduction to Advanced Features** (Video, 0:52): Introduces the following video
- 10.2. **Constant Radius Fillet** (Video, 5:45): Advanced options to apply fillets to geometry
- 10.3. **Variable Radius Fillet** (Video, 6:57): Gives you variable numbers along a line
- 10.4. **Face Fillet** (Video, 1:25): Creates fillets when you're dealing with a gap in the object
- 10.5. **Hold Line Fillet** (Video, 1:10): Fillets that need to extend to a certain line
- 10.6. **Curvature Continuous Fillet** (Video, 1:40): Another way to create a fillet on a face
- 10.7. **Full Round Fillet** (Video, 1:43): Allows you to completely round off an object
- 10.8. **Fillet Expert** (Video, 3:17): Used to adjust or resize a fillet
- 10.9. **Intro to Flex Feature** (Video, 0:39): Allows for a free form option to bend, stretch, and taper objects
- 10.10. **Flex Set Up** (Video, 7:48): Procedure to go through before begin flexing a part
- 10.11. **Bending** (Video, 4:25): Bending geometry using the flex feature
- 10.12. **Twisting** (Video, 1:19): Twisting geometry using the flex feature
- 10.13. **Taper** (Video, 1:23): Tapering using the flex feature
- 10.14. **Stretching** (Video, 1:14): Stretching using the flex feature
- 10.15. **Intro to Indent** (Video, 3:51): Allows you to change one solid body with another solid body
- 10.16. **Performing Multiple Indentions** (Video, 1:51): Instructions for performing this function all at one time
- 10.17. **Cutting with Indent** (Video, 0:55): Using the indent feature to cut solid bodies from one another
- 10.18. **Assignment: Create a keychain hand sanitizer wrap** (Text, 20:00): Using what you learned in the above lectures, design a silicone wrap for a hand sanitizer bottle using the fillets feature
- 10.19. **Check: Create a Keychain Hand Sanitizer Wrap** (Files, 10:00): Resources to check your work
- 10.20. **Need More Practice?** (Text, 15:00): Extra assignments to practice Advanced Features
- 10.21. **Practice Assessment** (Assignment, 10:00): Recreate the Samurai Bottle using the advanced shaping features
- 10.22. **Quiz: Advanced Lofting** (Quiz, 4 questions): Helps retain learnings from this lesson
- 10.23. **Survey Week 10** (Survey): Collects student responses to help The Packaging School continue to improve

11. Multibodies, Core and Cavity, and Fastening Features

- 11.1. **Introduction** (Video, 0:40): Introduces the following lesson
- 11.2. **Intro to Multibodies** (Video, 1:39): Useful for constricting certain features to different areas
- 11.3. **Creating Multibody Parts** (Video, 2:14): Features that are isolated from one another
- 11.4. **Splitting Bodies** (Video, 4:23): Allows you to split one body into multiple bodies
- 11.5. **Uses for Multibodies** (Video, 1:49): Useful for creating designs that have localized features
- 11.6. **Combining Multibodies** (Video, 4:41): Instructions for combining multibodies
- 11.7. **Cutting out Patterns** (Video, 2:43): Instructions for cutting out the pattern modeled after a part created in another file
- 11.8. **Positioning Solid Bodies** (Video, 2:09): Applying one part to another
- 11.9. **Draft Analysis** (Video, 8:47): Used to help eject something from a mold
- 11.10. **Scale** (Video, 1:47): Determined by the shrinkage that defines the material being used
- 11.11. **Parting Lines** (Video, 2:20): Where the positive and negative drafting parts meet on a particular feature
- 11.12. **Parting Surfaces** (Video, 2:02): Extend from the part so that the core and the cavity come together
- 11.13. **Creating a Mold** (Video, 3:49): Instructions for creating a mold
- 11.14. **Snap Hooks** (Video, 5:21): Using fastening features into solid parts

- 11.15. **Snap Groove** (Video, 2:10): Used to link a snap hook from one piece to another piece
- 11.16. **Vents** (Video, 4:53): Instructions for creating vents using the fastening features
- 11.17. **Lip and Groove** (Video, 2:45): Instructions for using this feature in 2 ways
- 11.18. **Lesson: Mold Design of a Bottle and Cap** (Text, 20:00): Step-by-step instructions for designing this object
- 11.19. **Assignment: Mold Design of a Jar** (Text, 20:00): Use what you learned in the lesson above to create your own jar mold
- 11.20. **Check: Mold Design of a Jar** (Files, 10:00): Resources to check your work
- 11.21. **Need More Practice?** (Text, 15:00): Extra assignments to practice Multibodies, Core and Cavity, and Fastening Features
- 11.22. **Practice Assessment** (Assignment, 10:00): Design the wildest USB drive you can think of - use the multi-body tools to split the part and core a cavity for the internal USB components
- 11.23. **Quiz: Multibodies, Core and Cavity, and Fastening Features** (Quiz, 3 questions): Helps retain learnings from this lesson
- 11.24. **Survey Week 11** (Survey): Collects student responses to help The Packaging School continue to improve

12. Photoworks

- 12.1. **Intro to Photoview** (Video, 1:41): Introduces the following lesson
- 12.2. **Adjusting the Scene** (Video, 3:47): Steps to prepare the rendering
- 12.3. **Applying Appearances** (Video, 2:31): Appearances give your model a more realistic look when creating a rendering
- 12.4. **Photoview 360 Lighting** (Video, 4:09): Adjusting the lighting to see how the rendering will look
- 12.5. **Orienting the Model** (Video, 1:56): Placement of the model within the scene
- 12.6. **Creating a Camera** (Video, 2:33): Instructions for creating a virtual camera to view your model
- 12.7. **Final Rendering** (Video, 2:29): Output settings before final rendering

13. Simulation

- 13.1. **Introduction to Simulation** (Video, 0:34): Introduces the following lesson
- 13.2. **Introduction to Simulation** (Video, 4:39): Simulation performs structural analysis on parts and assemblies
- 13.3. **Overview** (Video, 3:10): Activating Solidworks simulation products
- 13.4. **Creating a Study** (Video, 1:51): Define what kind of study you need to create your simulation
- 13.5. **Creating a Mesh** (Video, 3:50): Break the structure down into smaller shapes
- 13.6. **Defining the Environment** (Video, 4:18): Use fixtures and external loads to define how the part interacts with the environment
- 13.7. **Editing Plots** (Video, 1:42): Instructions for editing plots after you've created them
- 13.8. **Overview and Plots** (Video, 4:27): Goes over the basics of the simulation test after it's run
- 13.9. **Section Clipping** (Video, 3:09): Allows you to view a specific area of the plot
- 13.10. **ISO Clipping** (Video, 3:20): Allows you to view where the stresses are located in your part
- 13.11. **Displacement Plots** (Video, 4:11): Instructions for using this feature
- 13.12. **Factor of Safety Plots** (Video, 3:38): Allows you to have confidence in your design
- 13.13. **Lesson: Static Loading Simulation of the Filled Bottle** (Text, 20:00): Step-by-step instructions for designing this simulation
- 13.14. **Lesson: Drop Simulation of the Bottle** (Text, 20:00): Step-by-step instructions for designing this simulation
- 13.15. **Lesson: Frequency Analysis of the Filled Bottle** (Text, 20:00): Step-by-step instructions for designing this simulation
- 13.16. **Need More Practice?** (Text, 15:00): Extra assignments to practice simulation

- 13.17. **Practice Assessment** (Assignment, 10:00): Design the wildest USB drive you can think of - use the multi-body tools to split the part and core a cavity for the internal USB components
- 13.18. **Quiz: Simulation** (Quiz, 4 questions): Helps retain learnings from this lesson
- 13.19. **Survey Week 13** (Survey): Collects student responses to help The Packaging School continue to improve

SolidWorks Advanced

SolidWorks Advanced is offered by The Packaging School through a partnership with SolidProfessor. This course is designed for beginner to intermediate students who are interested in preparing for the CSWA Examination by the end of this course. Here, you'll dive deep into the more complex processes of Solidworks and broaden your skill set, even beyond the world of the packaging industry.

1. Starting SolidWorks

- 1.1. Introduction (Video, 1:30) introduces the following course
- 1.2. Interface Tour (Video, 2:41) Instructions for navigating this online course
- 1.3. View Manipulation
- 1.4. Intro to Sketching - Starting a Part
- 1.5. Starting a Sketch
- 1.6. Sketch Tools
- 1.7. Geometric Relations
- 1.8. Dimensions
- 1.9. Extrude Feature
- 1.10. Editing Geometry
- 1.11. Guided Exercise + Video: Basic Sketching
- 1.12. Guided Exercise + Video: Basic Extrude
- 1.13. Guided Exercise + Video: Editing Geometry

2. Part Design

- 2.1. Overview of Design
- 2.2. Creating the Base Feature
- 2.3. The Tab - Creating the Tab Profile
- 2.4. The Tab - Tab Design Intent
- 2.5. The Tab - Creating the Tab Feature
- 2.6. Hole in the Tab
- 2.7. Mirror Feature
- 2.8. Rollback Bar and Order of Features
- 2.9. Hole Wizard
- 2.10. Fillets
- 2.11. Materials
- 2.12. Mass Properties
- 2.13. Guided Exercise + Video: Mounting Block
- 2.14. Guided Exercise + Video: Bracket
- 2.15. Revolve Feature
- 2.16. Cutout and Circular Pattern
- 2.17. Linear Pattern
- 2.18. Ribs
- 2.19. Shell
- 2.20. Chamfer
- 2.21. Planes
- 2.22. Guided Exercise + Video: Pinion Mount
- 2.23. Guided Exercise + Video: Strainer

3. Assemblies and Drawings

- 3.1. Assembly Overview

- 3.2. Starting an Assembly
- 3.3. Inserting Additional Components
- 3.4. Move Components
- 3.5. Mating the Wheel
- 3.6. Mating the Pin
- 3.7. Toolbox
- 3.8. Exploded View
- 3.9. Working With Sub-Assemblies
- 3.10. Guided Exercise + Video: Basic Moving Assembly
- 3.11. Guided Exercise + Video: Brace Assembly
- 3.12. Guided Exercise + Video: Scissor Jack Assembly
- 3.13. Drawings Overview - Starting a New Drawing
- 3.14. Model Views
- 3.15. Projected Views
- 3.16. Model Items
- 3.17. Dimensions
- 3.18. Associativity
- 3.19. Annotations
- 3.20. Detail View
- 3.21. Section View
- 3.22. Assembly Drawing
- 3.23. Bill of Materials
- 3.24. Balloons
- 3.25. Guided Exercise + Video: Part Drawing - Clevis
- 3.26. Guided Exercise + Video: Part Drawing - Holder
- 3.27. Guided Exercise + Video: Part Drawing - Holder
- 4. CSWA Info and Prep**
 - 4.1. Why Get Certified?
 - 4.2. What is the CSWA?
 - 4.3. Preparing for the Exam
 - 4.4. SOLIDWORKS Versions
 - 4.5. Purchasing and Setting up the Exam
 - 4.6. Test Taking Strategy
 - 4.7. Practice Exams
 - 4.8. Multiple Choice Section Overview
 - 4.9. Model View
 - 4.10. Projected View
 - 4.11. Auxiliary View
 - 4.12. Section View
 - 4.13. Partial Section
 - 4.14. Aligned Section
 - 4.15. Broken Out Section
 - 4.16. Detail View
 - 4.17. Relative to Model
 - 4.18. Standard 3 View
 - 4.19. Break View
 - 4.20. Cropped View

- 4.21. Alternate Position View
- 4.22. Empty View
- 4.23. Predefined View
- 4.24. Modeling Question Preview
- 4.25. CSWA Part Exercise
- 4.26. Analyzing the Part Model
- 4.27. Setting up the Model
- 4.28. Where to Begin
- 4.29. Creating the First Feature
- 4.30. The First Cut-Out
- 4.31. The Remaining Cuts
- 4.32. Adding Fillets
- 4.33. Answering the Question
- 4.34. Updating the Geometry
- 5. Simulation Xpress**
 - 5.1. Modeling Question Preview
 - 5.2. CSWA Exercise - Part 2
 - 5.3. Where to Begin
 - 5.4. Sketching the Profile
 - 5.5. The Arc Cut-Outs
 - 5.6. Creating the Oval Pockets
 - 5.7. Adding the Fillets and Answering the Question
 - 5.8. Modifying the Part
 - 5.9. Assembly Model Preview
 - 5.10. CSWA Assembly Exercises
 - 5.11. Analyzing the Assembly
 - 5.12. Placing the First Component
 - 5.13. Using SmartMates to Position Components
 - 5.14. Placing the Piston Linkage Components
 - 5.15. Positioning the Rest of the Components
 - 5.16. Adding the Angle Mate and Answering the Questions
 - 5.17. Answering the Second Question

ELEC-E03 Leveraging Human Factors and Consumer Behavior Theory in Packaging Design

Example Lesson: https://www.youtube.com/watch?v=rv_smbK0hB0

Thousands of new products are being launched every day. How can a brand stand out from the rest and make a memorable mark on the consumer? The answer is knowing and utilizing human factors, also known as ergonomics. No matter our culture, our language, our color, or our gender – human factors are the psychological and sociological ways that we are all hard wired. How we perceive. How we think. How we're attracted. How we act. We will discuss over 80 examples of human factors like figure ground relationships, geometric rules, and design hierarchy techniques, all with references to modern packaging design. This online course will give you insight into how we use our senses to process the information we are bombarded with every day, and some tips and tricks to turn expectations on their ear. You will get the tools needed to incorporate disruption into your packaging design and encourage the bottom-up processing that will make your package jump off the shelf.

- 1. Perception** – Learn what influences perception and methods of increasing design perceptibility
 - 1.1. Introduction (Video, 3:35): Brief overview of the following module
 - 1.2. Sensory Processing (Video, 4:25): Explains the two most common methods of processing
 - 1.3. Depth Projection (Video, 4:12): Shares insight on how our brains perceive 3-dimensional objects
 - 1.4. Alignment (Video, 1:56): Informs why alignment is a key element in packaging design
 - 1.5. Closure (Video, 1:25): Explains how our brains close gaps between visual elements
 - 1.6. Constancy (Video, 1:43): Shares two common types of constancy our brain interprets
 - 1.7. Facesim Ratio (Video, 1:25): Introduces the ratio of facial elements to their surroundings
 - 1.8. Figure/Ground Relationships: (Video, 2:53): Defines the importance of objects in foreground and background areas
 - 1.9. Gutenberg Diagram (Video, 2:56): Highlights the typical eye map of consumers when viewing products
 - 1.10. Highlighting: (Video, 1:48): Uncovers the multiple ways to highlight text to differentiate it
 - 1.11. Iconic Representation (Video, 1:56): Allows viewer to understand the relationship between symbols and their meanings, as well as how to properly utilize them
 - 1.12. Law of Pragnanz (Video, 1:36): Offers insight on how our brains complete an image, even if it is only partially represented
 - 1.13. Proximity (Video, 00:42): Explains why our brain groups objects that are close together
 - 1.14. Signal to Noise Ratio (Video, 3:42): Enables understanding of proper usage of noise without causing product packaging to be too hard to interpret
 - 1.15. Threat Detection (Video, 4:16): Accounts for why our brain seeks out dangerous objects first when looking at visual elements
 - 1.16. Perception Application: (Discussion): Allows students to share examples of human factors in packaging design
- 2. Cognition** – Learn how we make cognitive decisions on products and packaging
 - 2.1. Introduction (Video, 1:46): Brief glimpse into the cognition module
 - 2.2. Working Memory (Video, 10:10): Explanation of how our memory plays into perception
 - 2.3. Hidden Messaging (Video, 5:06): Uncovering hidden messaging in packaging design
 - 2.4. Accessibility (Video, 1:17): Incorporates this design element for the masses
 - 2.5. Biophilia Hypothesis (Video, 2:36): A hypothesis that could explain why humans associate natural connections when seeing elements of life

- 2.6. Ben Franklin Effect (Video, 3:13): A phenomenon explaining why a person is likely to perform a favor in return for someone after receiving a favor
- 2.7. Classical Conditioning (Video, 5:04): An explanation of how packaging design can be associated with meanings and experiences and utilized in future designs
- 2.8. (Mere) Exposure Effect (Video, 1:44): Allows viewers to understand a subject's reaction to something after being exposed to it for a period of time
- 2.9. Immersion (Video, 2:20): Uncovers the relationship between an object and the viewer that results in a loss of awareness of their surroundings
- 2.10. Legibility (Video, 2:13): Defines legibility and its importance in packaging
- 2.11. Mnemonic Device (Video, 1:38): Recalling several popular ways of improving one's memory
- 2.12. Picture Superiority Effect (Video, 2:29): Explains how images can be used in place of text
- 2.13. Progressive Disclosure (Video, 1:33): Shares why a maximum amount of information should be used to avoid confusion
- 2.14. Readability (Video, 2:15): Diving into consumers' ability to understand and interpret prose
- 2.15. Recognition Over Recall (Video, 1:18): Allows viewers to discover why consumers can interpret information more often than recall it
- 2.16. Rosetta Stone (Video, 00:55): An informational video on the ability to use fundamental elements as representation rather than text
- 2.17. Serial Position Effect (Video, 1:58): Explains the consumer's ability to typically only remember items from the beginning and end of lists
- 2.18. Shaping (Video, 3:01): Offers an understanding of methods to reinforce behavior repeatedly
- 2.19. Von Restorff Effect (Video, 00:51): Shares why consumers remember unusual packaging
- 2.20. Emotion (Video, 2:45): Informs viewers why emotion plays into packaging design
- 2.21. Social Proof and Authority (Video, 2:43): The reasoning behind why consumers use products that others recommend or have mentioned using publicly
- 2.22. Tiger Woods Strategy (Video, 1:32): Helps viewers understand how Tiger Woods made iterative improvements and the relation to packaging
- 2.23. Storytelling (Video, 2:30): How using a narrative in your packaging can help consumers feel inclined to purchase the product
- 2.24. Availability Misweighing Effect (Video, 1:59): Explains why we think information we can recall easily is the most important
- 2.25. Cognition Application (Discussion): Promotes discussion between students of packaging designs related to this module of Human Factors

3. Fashion and Appeal – Learn how design appeal is influenced

- 3.1. Introduction
- 3.2. Attributes of Package Design
- 3.3. Archetypes
- 3.4. Anthropomorphic Design
- 3.5. Attractiveness Bias
- 3.6. Baby-Face Bias
- 3.7. Cognitive Dissonance
- 3.8. The Divine Proportion
- 3.9. Golden Ratio
- 3.10. Rule of Thirds
- 3.11. Framing
- 3.12. Most Average Facial Appearance Effect
- 3.13. Propositional Density

- 3.14. Savanna Preference
- 3.15. Scarcity
- 3.16. Waist-to-Hip Ratio
- 3.17. Cheerleader Effect
- 3.18. Conclusion

4. Design Decisions and Eye Tracking – Learn about eye-tracking and how to quantitatively assess packaging design

- 4.1. Introduction
- 4.2. Decision Making
- 4.3. Heuristics
- 4.4. Consumers vs. Shoppers
- 4.5. Aesthetic-Usability Effect
- 4.6. Affordance
- 4.7. Expectation Effects: Buyer Behavior
- 4.8. Flexibility-Usability Tradeoff
- 4.9. Form Follows Function
- 4.10. Hierarchy of Needs
- 4.11. Life Cycle
- 4.12. Ockham’s Razor
- 4.13. Performance vs. Preference
- 4.14. Scaling Fallacy
- 4.15. Ergonomics
- 4.16. Influence, Persuasion and Negotiation
- 4.17. LATCH

5. Conclusion

- 5.1. Wrap Up Video
- 5.2. Assessment
- 5.3. Survey

ELEC-E01 Fundamentals of Temperature Assurance Packaging Certification

Instructor: Sonoco ThermoSafe's ISC Labs

5 Micro-Lessons, 2 Hours

Developed by Sonoco ThermoSafe's ISC-Labs in partnership with The Packaging School, Dr. R. Andrew Hurley, Assistant Professor of Packaging Science at Clemson University, and an advisory panel of pharmaceutical manufacturers, wholesalers, logistics providers, and industry experts.

Micro-Lessons:

1. Introduction

- 1.1. TAP Introduction Video Acknowledgments
- 1.2. Orientation Survey
- 1.3. Cold Chain Glossary
- 1.4. Discussion: Orientation to TAP Foundations

2. Why Your Cold Chain Matters

- 2.1. Cold Chain Overview
- 2.2. TAP Tip: Temperature Control or Cold Chain? Proper Terminology
- 2.3. Interactive: Why Your Cold Chain Matters
- 2.4. Label Storage Versus Transportation Temperature
- 2.5. Families of Storage Temperature
- 2.6. Quick Reference Guide to Global GDP Guidelines
- 2.7. Evaluating a Temperature Excursion Q&A
- 2.8. How to Handle a Temperature Excursion

3. Industry Terminology

- 3.1. Temperature Assurance Packaging
- 3.2. Passive Packaging
- 3.3. Active Packaging
- 3.4. Qualification | Definition and Importance
- 3.5. Qualifying Packaging for Temperature Sensitive Products
- 3.6. Temperature Monitoring
- 3.7. Temperature Monitors

4. Scientific Principles

- 4.1. Introduction to Scientific Principles
- 4.2. The Laws of Thermodynamics
- 4.3. Heat Transfer Overview
- 4.4. Modes of Heat Transfer
- 4.5. How Payload Affects Your Packaging
- 4.6. Thermal

5. Materials & Technology

- 5.1. TAP Fundamentals Section D- Insulation Materials (Video, 7:42): Overview of various insulation materials

6. Shipping and Transit Considerations

7. Conclusion

PTI-P01 Introduction to Polymers and PET

Instructor: PTI Online Academy

1 Micro-Lesson, 40 Minutes

This is the first of a four part series. This session will give even a non-technical attendee the foundation needed to understand the uniqueness of PET and how its properties can be altered. It reviews polymer definitions, explains commonly used terminologies, and introduces how polymers are produced. The critical concept of amorphous and crystalline materials are explained in context with how this governs a polymer's properties. The session concludes with a description of thermal properties and how these are important to the blow molding of PET.

Micro-Lesson:

1. Introduction to Polymers and PET

1.1 Video Module (Video, 40:38): Learn various aspects of chemistry and polymer structure and how these can affect performance attributes

PTI-P02 PET Industry Overview, Manufacture and Properties

Instructor: PTI Online Academy

1 Micro-Lesson, 1 Hour

The second part of this series reviews current manufacturers of PET and how this material is used to make not just bottles but fibers, filaments, and sheet goods. PET manufacture is described using today's reliance on petroleum and natural gas to new technologies capable of producing the required monomers through bio-synthetic pathways. Current polymerization processes are reviewed that are used to produce materials with sufficiently high molecular weight, or Intrinsic Viscosity (IV) for use in bottle manufacture. The criticality of IV, from how it is measured through its impact on preform and bottle manufacture is introduced.

Micro-Lesson:

1. Introduction

1.1 Video Module (Video, 1:01:37): Learn part two of the materials series reviews of current suppliers and how PET is used to make not just bottles but fibers, filaments and sheet goods.

PTI-P03 Polymer to Preform

Instructor: PTI Online Academy

1 Micro-Lesson, 50 Minutes

The third part of this PET training program reviews the uniqueness that exists among bottle grade PET materials and how PET's properties can be altered. The conversion of PET pellets into preforms requires very diligent attention to detail that begins with the drying of PET through melt processing using conditions that minimize degradation. Various degradation mechanisms are reviewed along with a discussion on how the final preform quality is impacted by excessive loss of IV, enhanced generation of acetaldehyde, discoloration, and altered stretch characteristics.

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Micro-Lesson:

1. Polymer to Preform

1.1 **Video Module** (Video, 50:37): Learn part three of the materials series on the attributes of bottle grade PET materials and how properties can be altered

PTI-P04 PET Preform to Bottle

Instructor: PTI Online Academy

1 Micro-Lesson, 1 Hour

The last of this series describes the importance of developing strain-hardened crystals during blow molding to produce bottles with optimum properties. Techniques commonly used to measure the amount of crystallinity in the bottle are discussed. The concept of the Natural Stretch Ratio (NSR) of PET is reviewed and how it must be considered when designing and blowing preforms. The concept of heat-setting is introduced in order to reduce the stress that develops in a blown bottle. Lastly a number of common myths pertaining to PET bottles are discussed.

Micro-Lesson:

1. PET Preform to Bottle

1.1 **Video Module** (Video, 1:08:22): Learn part four of the materials series on the importance of developing strain-hardened crystals during blow molding to produce bottles with optimum properties

PTI-P05 Container Design and Development

Instructor: PTI Online Academy

1 Micro-Lesson, 1 Hour

This module describes the basic approach to designing containers. The following elements are covered: Gathering requirements for a new container design, defining a design brief, general approach to container design, selecting the appropriate finish and base for your container, and predicting container properties and sizing

Micro-Lesson:

1. Container Design and Development

1.1 **Video Module** (Video, 1:18:03): Obtain container design basics and how to predict package performance

PTI-P06 Preform Design

Instructor: PTI Online Academy

1 Micro-Lesson, 50 Minutes

This module describes the basic approach to designing preforms for PET bottles. The following elements are covered: Estimating the wall thickness requirements for bottles, methods of calculating stretch ratios of preforms into bottles, general approach to preform design, discussion of good design attributes for injection and blow molding, and evaluation of existing preform designs within new bottles.

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Micro-Lesson:

1. Preform Design

1.1 **Video Module** (Video, 50:13): Learn how to design preforms to place the right amount of material in the correct container location

PTI-P07 Barrier Container Technology

Instructor: PTI Online Academy

1 Micro-Lesson, 1 Hour

Many barrier solutions are commercially available for plastic bottles through passive and active barrier blends, multilayer, and coating technologies. Understanding and selecting the best option for a given product's shelf life needs is paramount to commercial success.

This presentation will explore methods, materials, and equipment at the forefront of barrier technologies. It will also provide an introduction to the predictive M-RULE® Container Performance Model and analytical testing methods that can be utilized to determine the most suitable barrier solution for a specific product. Though numerous technical solutions exist for PET bottles and hopes remain high for barrier alternatives, no single technology has been shown to satisfy the broad needs of brand owners and consumers. The pros and cons of each barrier technology are weighed in this presentation. In addition to bottle gas barrier technologies, closure and light barrier technologies are also examined.

Micro-Lesson:

1. Barrier Container Technology

1.1 **Video Module** (Video, 1:17:30): Learn the barrier technologies which increase the performance of rigid plastic containers

PTI-P08 PET Recycling

Instructor: PTI Online Academy

1 Micro-Lesson, 1 Hour

The volume of rigid PET bottles returned for recycling makes PET the most recycled plastic packaging material. This session will review historical and current recycling data taking into consideration the effects of right-weighting, deposit legislation, and industry initiatives directed at increasing the recycling rate. This discussion includes a review of how PET bottles are recycled to produce both non-food grade and food grade rPET, as well as explore the problematic issues that the industry must address. Particular emphasis is placed on package design as this plays a critical role in determining if that package will be able to be truly "recycled" using today's recycling technologies.

Micro-Lesson:

1. PET Recycling

1.1 **Video Module** (Video, 1:06:47): Grasp an overview of recycling methods used to reclaim PET and considerations for introducing rPET into new packages

PTI-P09 Material Handling and Drying

Instructor: PTI Online Academy

1 Micro-Lesson, 50 Minutes

In this session, PET material handling and drying will be covered. In the material handling portion, the different ways to receive and transfer material will be covered. Aggressive material handling can lead to problems such as fines and angel hair. The source of these and the equipment used to remove them is discussed in this session.

The drying process is an important phase of PET injection molding. This session will cover why PET should be dried and the methods used to remove moisture are reviewed; also, the effects of molding preforms with different levels of moisture in the resin are reviewed. The dryer parameters are reviewed and the effects of these parameters on the drying process are also covered.

Micro-Lesson:

1. Material Handling and Drying

1.1 Video Module (Video, 54:24): Learn how to properly transfer PET material and understand the importance of drying

PTI-P10 Blow Molding Process

Instructor: PTI Online Academy

1 Micro-Lesson, 1.5 Hours

This section will cover blow molding fundamentals, controls, and processing. The main goal of this session will be to provide an understanding of the blow molding variables and their relationships and gain an understanding of the machine operation and how making changes can affect the quality of the bottles. Some of the solutions to these quality concerns are also covered in this session. The following items will be covered in this section: Layout of the machine, machine operations, blow wheel configuration, machine controls, stretching, pre-blowing, blowing, relationships, preform transfer, and bottle transfer/exit.

Micro-Lesson:

1. Blow Molding Process

1.1 Video Module (Video, 1:28:13): Learn different ways to blow PET containers and the steps used to control the process

ELEC-E05 Project Management Essentials

32 Micro-Lessons, 2 hours

In this course, you will gain a strong working knowledge of the basics of project management. You will be able to immediately apply this knowledge to effectively manage your current packaging projects.

Learning Objectives:

1. Understand the basics of project management.
2. Identify how to define a project.
3. Discuss how to plan for a project from start to finish.
4. Evaluate best practices to control a project.
5. Leverage effective project management tools.

1. Basics of Project Management and Leadership

- 1.1. **Welcome to the Course** (Video, 1:47): Introduction to the topic and expectations outline
- 1.2. **Project Management 101** (Presentation, 5:25): Discussion of the key aspects of project management
- 1.3. **Project Management Skills** (Infographic, 2:00): Highlights various skills of successful project managers
- 1.4. **Art and Science of Project Leadership** (Video, 3:02): Explains how project management is art and science
- 1.5. **Main Causes of Project Failure** (Text, 4:00): Outline of documented causes of project failure

2. Defining the Project

- 2.1. **Introduction** (Video, 1:04): General introduction to defining a project
- 2.2. **Project Initiation** (Video, 4:14): Discussion of the first phase in the project cycle
- 2.3. **Basic Proposal Content** (Infographic, 2:00): Basic topics every proposal should cover
- 2.4. **Knowing Your Stakeholders** (Presentation, 6:00): Explanation of the stakeholders present in every project
- 2.5. **Knowledge Check** (Quiz, 5 questions): Helps retain learnings from this lesson

3. Planning the Project

- 3.1. **Introduction** (Video, 0:57): General introduction to planning a project
- 3.2. **Risk Management** (Presentation, 7:00): Investigates types of risks and how they can be mitigated
- 3.3. **Work Breakdown Structure** (Video, 2:48): Defines how to break your project into parts
- 3.4. **Sensible Scheduling** (Text, 6:00): Outlines the steps for scheduling
- 3.5. **Estimating** (Presentation, 5:00): Fundamentals of estimating and common mistakes
- 3.6. **Knowledge Check** (Quiz, 6 questions): Helps retain learnings from this lesson

4. Controlling the Project

- 4.1. **Introduction** (Video, 0:55): General introduction to controlling a project
- 4.2. **Building a Team** (Video, 3:11): How to build a high performance project team
- 4.3. **DiSC Method** (Presentation, 3:00): Basics of this tool
- 4.4. **Project Communication** (Text, 5:00): Defines how to create an effective communication plan

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- 4.5. **Controlling Scope** (Presentation, 5:00): Explains the change control process and configuration management
- 4.6. **Measuring Progress** (Text, 7:00): Techniques to measure progress
- 4.7. **Knowledge Check** (Quiz, 4 questions): Helps retain learnings from this lesson
- 4.8. **DiSC Method Discussion** (Discussion): Discussion of students' results
- 5. Effective Project Management**
 - 5.1. **Introduction** (Video, 1:15): General introduction to various project management tools
 - 5.2. **Trello** (Text, 2:00): Basics of this tool
 - 5.3. **Asana** (Text, 2:00): Basics of this tool
 - 5.4. **Podio** (Text, 2:00): Basics of this tool
 - 5.5. **Evernote** (Text, 2:00): Basics of this tool
 - 5.6. **Basecamp** (Text, 2:00): Basics of this tool
 - 5.7. **Effective Project Management Tools Discussion** (Discussion): Discussion of students' opinions
- 6. Wrap Up**
 - 6.1. **That's a Wrap!** (Video, 1:40): Conclusive outline of Effective Project Management
 - 6.2. **Assessment** (Test, 30 questions): Questions pulled from every section of the course
 - 6.3. **Survey** (Survey): Collects student responses to help The Packaging School continue to improve

ELEC-E06 Pressure Sensitive Labels

35 Micro-Lessons, 2.5 Hours

By taking Pressure Sensitive Labels 101, you will learn first-hand the essentials of the world's leading label type. Developed and taught by UPM Raflatac's world-renowned experts, the Pressure Sensitive Labels 101 course includes an overview of the global pressure sensitive labels market, decoration technologies and market share, label construction, press converting, end use application, performance testing and so much more.

- 1. Decoration Technologies & Market Share**
 - 1.1. Welcome to PS 101!
 - 1.2. How to Navigate the Course
 - 1.3. Pressure Sensitive Labels Defined
 - 1.4. Global & Pressure Sensitive Labels Market
 - 1.5. Prime, Variables, & Specials
 - 1.6. Label Stock Value Chain
 - 1.7. Discussion- Let's Get to Know Each Other!
- 2. Pressure Sensitive Label Construction**
 - 2.1. Pressure Sensitive Label Construction
 - 2.2. Introduction to PS Label Construction
 - 2.3. Anatomy of a Label
 - 2.4. Face Stock
 - 2.5. Adhesives
 - 2.6. Liners
 - 2.7. Knowledge Check: PS Construction
- 3. Coating & Laminating a Pressure Sensitive Construction**
 - 3.1. Introduction to Coating and Laminating
 - 3.2. Basic Steps in the PS Coating and Laminating Process
 - 3.3. Knowledge Check: Coating and Laminating a PS Construction
- 4. Press Converting**
 - 4.1. Introduction to Press Converting
 - 4.2. The Label Converting Process
 - 4.3. Die Cutting
 - 4.4. Stripping the Matrix
 - 4.5. Finishing
 - 4.6. Knowledge Check: Press Converting
- 5. End Use Application**
 - 5.1. Introduction to End Use Application
 - 5.2. VIP Labels
 - 5.3. Prime Labels
 - 5.4. Knowledge Check: End Use Application
- 6. Pressure Sensitive Handling**
 - 6.1. Introduction to Pressure Sensitive Handling
 - 6.2. General Handling and Storage
 - 6.3. Knowledge Check: Pressure Sensitive
- 7. Performance Testing**
 - 7.1. Introduction to Performance Testing

- 7.2. Typical Test Methods
- 7.3. Knowledge Check: Performance Testing

8. Conclusion

- 8.1. Conclusion
- 8.2. Final Assessment
- 8.3. Course Survey
- 8.4. Education Partners

ELEC-E09 Liquid Filling

65 Micro-Lessons, 4 hours

In this course, John Henry takes a deep dive into liquid filling machinery. He teaches all of the different architectures and their benefits/drawbacks as well as container handling and product handling.

1. Liquid Filling

- 1.1. Welcome to the Course!
- 1.2. Introduction to Liquid Filling
- 1.3. Speed
- 1.4. Filler Classification
- 1.5. Filler Criteria
- 1.6. Knowledge Check: Liquid Filling

2. Container Handling

- 2.1. Introduction to Container Handling
- 2.2. Container Indexing
- 2.3. Starwheel and Timing Screw Indexing
- 2.4. Timing Screws
- 2.5. Continuous vs. Intermittent Conveyor Motion
- 2.6. Cross-Indexing
- 2.7. Nozzle Diving
- 2.8. Drip Control
- 2.9. Neck Capture
- 2.10. Centering Bell
- 2.11. Knowledge Check: Container Handling

3. Liquid Filling Reservoirs and Nozzles

- 3.1. Introduction
- 3.2. Reservoirs
- 3.3. Nozzles
- 3.4. Knowledge Check: Liquid Filling Reservoirs and Nozzles

4. Volumetric Fillers: Piston

- 4.1. Introduction
- 4.2. Piston Fillers
- 4.3. Drives
- 4.4. Servo Motors
- 4.5. Diaphragm Pumps
- 4.6. Step Filling
- 4.7. Knowledge Check: Volumetric Filler-Pistons

5. Non-Piston Volumetric Fillers

- 5.1. Introduction
- 5.2. Rotary Gear Pumps
- 5.3. Augur Fillers
- 5.4. Peristaltic Pump
- 5.5. Weight Fillers (Load Cell/Scale)
- 5.6. Mass Flow Meter Systems

- 5.7. Mechanical Flow Meters
- 5.8. Time/Pressure Filling
- 5.9. Time/Gravity Filling
- 5.10. Standpipe Fillers
- 5.11. Knowledge Check: Non-Piston Volumetric Fillers
- 6. Level Fillers**
 - 6.1. Introduction
 - 6.2. Siphon Fillers
 - 6.3. Overflow Fillers
 - 6.4. Gravity Fillers
 - 6.5. Pressure Fillers
 - 6.6. Vacuum Fillers
 - 6.7. Brining Fillers
 - 6.8. Bowl Fillers
 - 6.9. Cascade Fillers
 - 6.10. Level Sensing Fillers
 - 6.11. Knowledge Check: Level Fillers
- 7. Counter Pressure Filling**
 - 7.1. Introduction
 - 7.2. Specifics
 - 7.3. Filling Steps
 - 7.4. Process
 - 7.5. Safety
 - 7.6. Knowledge Check: Counter Pressure Filling
- 8. Other Fillers**
 - 8.1. Introduction
 - 8.2. In-Case Filling
 - 8.3. Drum Filling
 - 8.4. Tube Fillers
 - 8.5. Sterile Products
 - 8.6. Flammable and Explosive Liquid Filling
 - 8.7. Knowledge Check: Other Fillers
- 9. Wrap Up**
 - 9.1. Course Survey
 - 9.2. Final Assessment

ELEC-E07 Bioplastics for Packaging

11 Micro-Lessons, 1 hour

This course will provide an introduction to the area of bioplastics and provide guidance in the use of these materials for packaging applications, in order to address some of the global sustainability issues.

1. Bioplastics for Packaging

- 1.1. Introduction to Bioplastics
- 1.2. What are Bioplastics?
- 1.3. Beginning and End of Life for Bioplastics
- 1.4. Misconceptions About Bioplastics
- 1.5. Commercially Available Bioplastics
- 1.6. Global Standards/Certifications for Biodegradable Bioplastics
- 1.7. Global Production Capacities of Bioplastics
- 1.8. Opportunities to Apply Bioplastics in Packaging
- 1.9. Key Steps to Developing Packaging Based on Bioplastics
- 1.10. Wrap Up
- 1.11. Knowledge Check: Bioplastics

Augmented Reality for Packaging

8 Micro-Lessons, 30 minutes

Augmented reality offers enormous untapped potential for brands to revolutionize their packaging and the way they connect and engage with the consumers of today. Packaging is powerful and in this short course, you'll be exposed to more than 20 AR examples on the shelf right now. You'll also be introduced to our Packaging AR Development storyboard where we'll walk you through how to develop your own packaging AR experience. Finally, you get a snapshot of how you can leverage AR in ways that attract and retain shopper attention - and deepen the relationship between your brand - your product - and your consumer through packaging.

1. Augmented Reality

- 1.1. Introduction
- 1.2. Examples in Packaging
- 1.3. Software Developers
- 1.4. 19 Crimes: A Case Study
- 1.5. AR Project Checklist
- 1.6. Wrap Up
- 1.7. Tell Us Your Thoughts!
- 1.8. Survey

ELEC-E08 Cannabis Packaging

15 Micro-Lessons, 1 hour

Contrary to popular stereotypes, the cannabis industry is comprised of highly educated professionals specializing in accounting, advocacy, agriculture, compliance, customer service, sales, technology, packaging, and more. With medical cannabis now legal in more than half of the U.S. and recreational cannabis use legal in ten states (and counting), cannabis companies are scrambling to fill a rush of new jobs in the industry -- an estimated 340,000 of them nationwide by 2020. This course will discuss the types of products being derived from cannabis sativa, from the traditional flower to processed products. We'll talk about methods of packaging as well as suppliers and stakeholders in the packaging industry that work with cannabis brands. This is important, as there are many supply chain and transport obstacles to overcome for emerging cannabis brands and suppliers in this developing Consumer Packaged Goods category.

1. Cannabis Packaging

- 1.1. Introduction
- 1.2. Course Disclaimer
- 1.3. Let's Talk About Cannabis
- 1.4. Market Overview
- 1.5. Cannabis Terpenes and Their Benefits
- 1.6. Packaging Specifications
- 1.7. Best Practices and Examples
- 1.8. Packaging Design Trends
- 1.9. Pertinent Laws and Regulations
- 1.10. awsuits
- 1.11. Cannabis Packaging Issues
- 1.12. Wrap Up
- 1.13. Knowledge Check: Cannabis
- 1.14. Sources
- 1.15. Survey

ISBT-I02 Sanitation for Fountain Beverages

14 Micro-Lessons, 1 hour

No doubt, this topic is a critical one for the beverage industry. Cleaning and sanitizing fountain beverage systems has always been a necessity, but maybe not a priority. And the consequences for not following proper sanitation protocols affect not only beverage quality and taste, but also the health of the consumer. Our course will give you information about sanitizing solutions, beverage dispenser cleaning, ice container cleaning, flushing syrup lines—all the current processes you need to keep your beverage systems clean

1. Sanitation for Foundation Beverages

- 1.1. Welcome (Video, 2:00)
- 1.2. In the News (Presentation, 6:00)
- 1.3. Chemistry Behind Cleaning (Video, 4:00)
- 1.4. Cleaning Agents (Text, 5:00)
- 1.5. Beverage Dispenser Cleaning: Bar Gun (Video, 3:00)
- 1.6. Beverage Dispenser Cleaning: Countertop and Drop-In Units (Video, 4:00)
- 1.7. The Royal Flush (Presentation, 4:00)
- 1.8. Syrup Supply Line Cleaning Recap (PDF, 5:00)
- 1.9. Ice Handling (Text, 6:00)
- 1.10. Material Handling Do's and Do Not's (PDF, 2:00)
- 1.11. Sanitizer Inspection Log (PDF, 5:00)
- 1.12. Knowledge Check (Quiz, 10 Questions)
- 1.13. Wrap Up (PDF, 1:00)
- 1.14. Survey (Questionnaire)

ISBT-I03 Beverage Ingredients Bundle

139 Micro-Lessons, 9 hours

Every organization in the beverage industry needs to have trained personnel with the knowledge of beverage fundamentals, industry best practices, technical guidelines, and current technology. As the premier technical beverage industry society, ISBT® is in the unique position to offer you the very best in professional development and training solutions. In order to supply beverages, we must have ingredients. Without them, a beverage cannot exist. There are different types of beverages, and, naturally, these different types have different ingredients. This Beverage Ingredients course offers a deep dive into understanding the principles of the chemistry, manufacturing, quality guidelines, and applications of the most common ingredients in beverages we consume.

1. ISBT-M01 Ingredients: Caramel Color (12 Micro-Lessons, 35 Minutes)

- 1.1. Welcome (Video, 2:00)
- 1.2. History and Definition of Caramel (PDF, 5:00)
- 1.3. Classifications of Caramel Color (Presentation, 4:00)
- 1.4. Caramel Color Manufacturing (Video, 2:00)
- 1.5. Key Properties of Caramel Color (Video, 6:00)
- 1.6. Labeling and Regulations (PDF, 5:00)
- 1.7. Frequently Asked Questions (PDF, 2:00)
- 1.8. Trade Organizations (PDF, 2:00)
- 1.9. Conclusion (Video, 1:00)
- 1.10. Knowledge Check (Quiz, 10 Questions)
- 1.11. Survey (Questionnaire)

2. ISBT-M02 Ingredients: Carbon Dioxide (14 Micro-Lessons, 50 Minutes)

- 2.1. Welcome (Video, 2:00)
- 2.2. History of Carbon Dioxide in Beverages (PDF, 4:00)
- 2.3. Key Facts (PDF, 4:00)
- 2.4. Physical States and Properties of Carbon Dioxide (Presentation, 5:00)
- 2.5. Supply Chain and Storage (Video, 2:00)
- 2.6. Carbon Dioxide Bottling Operations (PDF, 5:00)
- 2.7. Quality Guidelines (PDF, 5:00)
- 2.8. Applications and Functionality (Presentation, 8:00)
- 2.9. Carbon Dioxide Safety (Video, 5:00)
- 2.10. Equipment Maintenance Recommendations (PDF, 2:00)
- 2.11. Vendor Checklist (Presentation, 4:00)
- 2.12. Conclusion (Video, 1:00)
- 2.13. Knowledge Check (Quiz, 10 Questions)
- 2.14. Survey (Questionnaire)

3. ISBT-M03 Ingredients: Color (12 Micro-Lessons, 50 Minutes)

WEB: PackagingSchool.com

ADDRESS: 3620 Pelham Rd. #294 Greenville, SC 29615

PHONE: 864-412-5000

- 3.1. Welcome (Video, 2:00)
- 3.2. Market Overview (PDF, 5:00)
- 3.3. Why We Use Colors (Video, 2:00)
- 3.4. Color Psychology (Presentation, 6:00)
- 3.5. FDA Regulated Colorants (PDF, 5:00)
- 3.6. Certified Colors for Food and Beverage (Presentation, 5:00)
- 3.7. Natural Colors for Food and Beverage Applications (Video, 12:00)
- 3.8. US Labeling of Natural and Certified Colors (PDF, 4:00)
- 3.9. Global Labeling of Natural and Certified Colors (PDF, 4:00)
- 3.10. Conclusion (Video, 1:00)
- 3.11. Knowledge Check (Quiz, 10 Questions)
- 3.12. Survey (Questionnaire)

4. ISBT-M04 Ingredients: Emulsions (11 Micro-Lessons, 45 Minutes)

- 4.1. Welcome (Video, 2:00)
- 4.2. Beverage Emulsifier Markets/Trends (Video, 3:00)
- 4.3. Introduction to Emulsion Science (Video, 3:00)
- 4.4. Beverage Emulsion Applications (PDF, 4:00)
- 4.5. Types of Emulsion Product Lines (PDF, 6:00)
- 4.6. Natural Emulsifiers (Video, 6:00)
- 4.7. Foaming Agents (PDF, 5:00)
- 4.8. Regulatory Requirements (6:00)
- 4.9. Conclusion (Video, 1:00)
- 4.10. Knowledge Check (Quiz, 10 Questions)
- 4.11. Survey (Questionnaire)

5. ISBT-M05 Ingredients: Flavor Chemistry (13 Micro-Lessons, 55 Minutes)

- 5.1. Welcome (Video, 2:00)
- 5.2. History of Flavoring Timeline (Presentation, 8:00)
- 5.3. Flavors Market (PDF, 3:00)
- 5.4. Flavor Overview (Video, 3:00)
- 5.5. Perception of Flavor (Video, 3:00)
- 5.6. How are Flavors Defined? (PDF, 8:00)
- 5.7. How are Flavors Labeled? (PDF, 5:00)
- 5.8. Flavor Composition (Video, 6:00)
- 5.9. Flavor Manufacturing (PDF, 5:00)
- 5.10. Raw Material for Flavor Development (Video, 7:00)
- 5.11. Conclusion (PDF, 1:00)
- 5.12. Knowledge Check (Quiz, 10 Questions)
- 5.13. Survey (Questionnaire)

6. ISBT-M06 Ingredients: High Fructose Corn Syrup (HFCS) (11 Micro-Lessons, 50 Minutes)

- 6.1. Welcome (Video, 2:00)

- 6.2. History of HFCS (PDF, 6:00)
- 6.3. Sweetener Chemistry (Presentation, 5:00)
- 6.4. Raw Materials and Manufacturing (Video, 4:00)
- 6.5. Quality Guidelines and Analysis (PDF, 6:00)
- 6.6. Storage and Handling (Video, 4:00)
- 6.7. Regulations, Labeling, and Nutrition (PDF, 4:00)
- 6.8. Applications and Functionality (Video, 11:00)
- 6.9. Conclusion (Video, 1:00)
- 6.10. Knowledge Check (Quiz, 10 Questions)
- 6.11. Survey (Questionnaire)

7. ISBT-M07 Ingredients: High Potency Sweeteners (14 Micro-Lessons, 55 Minutes)

- 7.1. Welcome (Video, 2:00)
- 7.2. Basics of High Potency Sweeteners (PDF, 5:00)
- 7.3. Saccharin (Video, 4:00)
- 7.4. Aspartame (Video, 6:00)
- 7.5. Acesulfame Potassium (Ace-k) (Presentation, 5:00)
- 7.6. Sucralose (Video, 3:00)
- 7.7. Neotame (Presentation, 5:00)
- 7.8. Advantame (Presentation, 5:00)
- 7.9. Sweetener Comparisons (PDF, 7:00)
- 7.10. Sweetener Blends (Video, 3:00)
- 7.11. Comparison Chart (PDF, 6:00)
- 7.12. Conclusion (Video, 1:00)
- 7.13. Knowledge Check (Quiz, 10 Questions)
- 7.14. Survey (Questionnaire)

8. ISBT-M08 Ingredients: Preservatives (11 Micro-Lessons, 50 Minutes)

- 8.1. Welcome (PDF, 2:00)
- 8.2. History and Basics of Preservatives (Text, 5:00)
- 8.3. The Science of Preservatives (Presentation, 5:00)
- 8.4. Types of Food and Beverage Preservatives (Video, 7:00)
- 8.5. Weak-Acid Preservatives (Text, 5:00)
- 8.6. Deep Dive: Benzoates (Video, 5:00)
- 8.7. Deep Dive: Dimethyl Dicarbonate (DMDC) (Video, 6:00)
- 8.8. Regulatory Requirements, Labeling, and Safety (Text, 5:00)
- 8.9. Conclusion (PDF, 1:00)
- 8.10. Knowledge Check (Quiz, 10 Questions)
- 8.11. Survey (Questionnaire)

9. ISBT-M09 Ingredients: Sensory Testing for Ingredients (9 Micro-Lessons, 35 Minutes)

- 9.1. Welcome (Video, 2:00)
- 9.2. Fundamentals (Video, 6:00)
- 9.3. Trends (PDF, 3:00)
- 9.4. Interaction of Senses (Video, 2:00)
- 9.5. Common Tests (PDF, 8:00)
- 9.6. Elements for Effective Testing (Video, 8:00)

- 9.7. Conclusion (Video, 1:00)
- 9.8. Knowledge Check (Quiz, 10 Questions)
- 9.9. Survey (Questionnaire)

10. ISBT-M10 Ingredients: Stabilizers (8 Micro-Lessons, 35 Minutes)

- 10.1. Welcome (PDF, 2:00)
- 10.2. Beverage Stabilizer Market Overview (PDF, 5:00)
- 10.3. Stabilizer Basics (Video, 3:00)
- 10.4. Introduction to Stabilizer Science (Presentation, 3:00)
- 10.5. Food and Beverage Stabilizer Applications (PDF, 4:00)
- 10.6. Gellan Gum (Video, 6:00)
- 10.7. Conclusion (PDF, 1:00)
- 10.8. Knowledge Check (Quiz, 10 Questions)
- 10.9. Survey (Questionnaire)

11. ISBT-M11 Ingredients: Stevia (11 Micro-Lessons, 35 Minutes)

- 11.1. Welcome (Video, 1:00)
- 11.2. History of Stevia (Presentation, 6:00)
- 11.3. Stevia Chemistry (PDF, 5:00)
- 11.4. Raw Materials and Production of Stevia (Video, 3:00)
- 11.5. Quality Guideline and Analysis (PDF, 5:00)
- 11.6. Regulations and Safety (PDF, 5:00)
- 11.7. Applications and Functionality (Video, 6:00)
- 11.8. Existing and Emerging Technology (PDF, 2:00)
- 11.9. Conclusion (Video, 1:00)
- 11.10. Knowledge Check (Quiz, 10 Questions)
- 11.11. Survey (Questionnaire)

12. ISBT-M12 Ingredients: Sucrose (11 Micro-Lessons, 40 Minutes)

- 12.1. Welcome (Video, 1:00)
- 12.2. History and Basics of Sucrose (PDF, 6:00)
- 12.3. Sucrose Chemistry (Presentation, 5:00)
- 12.4. Raw Materials and Manufacturing (Video, 5:00)
- 12.5. Quality of Granular Sucrose (Presentation, 8:00)
- 12.6. Analytical Guidelines for Granular Sucrose (PDF, 5:00)
- 12.7. Liquid Sucrose (PDF, 5:00)
- 12.8. Functionality and Applications (Video, 4:00)
- 12.9. Conclusion (Video, 1:00)
- 12.10. Knowledge Check (Quiz, 10 Questions)
- 12.11. Survey (Questionnaire)

13. ISBT-M13 Ingredients: Water (13 Micro-Lessons, 55 Minutes)

- 13.1. Welcome (PDF, 2:00)
- 13.2. Importance of Water as an Ingredient (Video, 3:00)
- 13.3. Water Quality (PDF, 6:00)
- 13.4. Water Supply Challenges (Video, 5:00)
- 13.5. Water Sources (Video, 10:00)

- 13.6. Source Contamination (Presentation, 5:00)
- 13.7. Source Protection (Presentation, 5:00)
- 13.8. Introduction to Water Treatment (PDF, 4:00)
- 13.9. Regulatory Requirements (PDF, 4:00)
- 13.10. Key Takeaways (PDF, 3:00)
- 13.11. Conclusion (PDF, 1:00)
- 13.12. Knowledge Check (Quiz, 10 Questions)
- 13.13. Survey (Questionnaire)

ISBT-I04 Beverage Gases: Argon, Oxygen, and Nitrogen

13 Micro-Lessons, 45 minutes

Argon, Nitrogen, and Oxygen—gases in the air surrounding us—are colorless, odorless, tasteless, and non-irritating. And used in a wide variety of markets and applications within the food and beverage industry. We’ve created this course to give you an understanding of their history, properties, purity requirements, hazards, safety precautions, and more. You’ll be given equipment maintenance recommendations and get a look at ISBT’s Beverage Grade Nitrogen Quality Guideline.

14. Beverage Gases: Argon, Oxygen, Nitrogen

- 14.1. Welcome (Video, 1:00)
- 14.2. The Basics and History (Video, 1:00)
- 14.3. Fast Facts: Nitrogen and Argon (PDF, 3:00)
- 14.4. Fast Facts: Oxygen (PDF, 2:00)
- 14.5. Properties and Specification Requirements (PDF, 5:00)
- 14.6. Nonflammable Gas Hazards (Nitrogen and Argon) (Video, 4:00)
- 14.7. Oxygen Hazards (Video, 3:00)
- 14.8. Cryogenic Hazards (PDF, 4:00)
- 14.9. General Safety Precautions (PDF, 2:00)
- 14.10. Nitrogen Uses in the Beverage Industry (PDF, 5:00)
- 14.11. Markets and Applications (PDF, 5:00)
- 14.12. Minimum Equipment Maintenance Recommendations (PDF, 2:00)
- 14.13. Knowledge Check (Quiz, 12 Questions)
- 14.14. Survey (Questionnaire)

ISBT-I05 Introduction to Microbiology

14 Micro-Lessons, 1 hour

If you work in the field of microbiology, these topics will be old hat. But for those of us who are relying strictly on high school biology, we might need a refresher. And this course is just that. An overview of the broad topic of microbiology and how it plays into the food and beverage industry. Microbiology is **the** study of small living things called microbes or microorganisms—things so small they must be viewed with a microscope. Just don't let their size fool you. They can be either extremely beneficial or extremely detrimental to the beverage making process. Besides an overview, we'll cover the various types of microbes including yeasts, molds, and bacteria. We'll learn which ones are of concern to beverages and foods and the available microbial control strategies to combat their growth or spread. Anyone training as a member of an HACCP team, starting in a new position with microbiology and food safety responsibilities, or needing a prerequisite for more advanced training down the road will benefit from this course.

1. Introduction to Microbiology

- 1.1. Welcome (Video, 1:00)
- 1.2. The Basics (Video, 2:00)
- 1.3. Type of Microbes (Presentation, 10:00)
- 1.4. Factors Affecting Growth (Video, 5:00)
- 1.5. Pathogenic Microbes in Beverages (Video, 2:00)
- 1.6. Spoilage Microbes in Beverages (Video, 5:00)
- 1.7. Indicator and Commensal Microbes in Beverages (Presentation, 5:00)
- 1.8. Pathogens in Foods (PDF, 10:00)
- 1.9. Microbial Control Strategies (Presentation, 5:00)
- 1.10. Spoilage Microbes in Foods (PDF, 5:00)
- 1.11. Good Manufacturing Practices (GMPs) and Sanitation (Video, 6:00)
- 1.12. Biofilms (Presentation, 4:00)
- 1.13. Key Takeaways (PDF, 3:00)
- 1.14. Knowledge Check (Quiz, 21 Questions)
- 1.15. Survey (Questionnaire)