1. The Design Process
   - The Role of the Materials Engineer in Design
   - Overview of the Design Process
   - Conceptual and Configuration Design of Products and Assemblies
   - Conceptual and Configuration Design of Parts
   - Creative Concept Development
   - Cross-Functional Design Teams

2. Criteria and Concepts in Design
   - Concurrent Engineering
   - Designing to Codes and Standards
   - Statistical Aspects of Design
   - Reliability in Design
   - Life-Cycle Engineering and Design
   - Design for Quality
   - Robust Design
   - Risk and Hazard Analysis in Design
   - Human Factors in Design
   - Environmental Aspects of Design
   - Safety in Design
   - Products Liability and Design

3. Design Tools
   - Computer-Aided Design
   - Mechanism Dynamics and Simulation
   - Finite Element Analysis
   - Computational Fluid Dynamics
   - Computer-Aided Electrical/Electronic Design
   - Design Optimization
   - Dimensional Management and Tolerance Analysis
   - Documenting and Communicating the Design
   - Rapid Prototyping

4. The Materials Selection Process
   - Overview of the Materials Selection Process
   - Techno-Economic Issues in Materials Selection
   - Material Property Charts
   - Performance Indices
Decision Matrices in Materials Selection
Relationship between Materials Selection and Processing
Computer-Aided Materials Selection
Value Analysis in Materials Selection and Design
Use of Failure Analysis in Materials Selection

5. Effects of Composition, Processing, and Structure
   On Materials Properties
   Introduction to the Effects of Composition, Processing, and Structure
   on Materials Properties
   Fundamental Structure-Property Relationships in Engineering
   Materials
   Effects of Composition, Processing, and Structure on Properties of
   Irons and Steels
   Effects of Composition, Processing, and Structure on Properties of
   Nonferrous Alloys
   Effects of Composition, Processing, and Structure on Properties of
   Ceramics and Glasses
   Effects of Composition, Processing, and Structure on Properties of
   Engineering Plastics
   Effects of Composition, Processing, and Structure on Properties of
   Composites
   Effects of Surface Treatments on Materials Performance
   Sources of Materials Property Data and Information

6. Properties versus Performance of Materials
   Properties Needed for the Design of Static Structures
   Design for Fatigue Resistance
   Design for Fracture Toughness
   Design for Corrosion Resistance
   Design for High-Temperature Applications
   Design for Oxidation Resistance
   Design for Wear Resistance
   Properties Needed for Electronic and Magnetic Applications
   Design with Brittle Materials
   Design with Plastics
   Design with Composites

7. Manufacturing Aspects of Design
   Introduction to Manufacturing and Design
   Design for Manufacture and Assembly
   Manufacturing Processes and Their Selection
   Modeling of Manufacturing Processes
Manufacturing Cost Estimating
Design for Casting
Design for Deformation Processes
Design for Powder Metallurgy
Design for Machining
Design for Joining
Design for Heat Treatment
Design for Ceramic Processing
Design for Plastics Processing
Design for Composite Manufacture
Control of Residual Stresses
Design for Surface Finishing