COURSE OUTLINES:

Part One Introduction

- Background
- Definitions
  - Accident
  - Hazard
  - Risk
- Tasks of Hazard Assessment
- Implementation Procedure
- Risk Reduction Measures
- “Acceptable” Risk
- Legislation and Law

Part Two Hazard Identification and Assessment

- Checklist
- Hazard Surveys
  - Dow’s Fire & Explosion Index
  - Dow’s Chemical Exposure Index
- Hazard and Operability (HAZOP) Studies
  - Principles of HAZOP
  - Guide Words
  - Examples
- Failure Modes and Effects Analysis (FMEA)
- Fault Tree Analysis (FTA)
  - Introduction
  - Problem Definition
  - Fault-tree Synthesis Procedures
    - Heuristic Guidelines
    - Computer-aided Tools
      - Digraphs
      - The Lapp-Powers Algorithm
      - Trees
Negative Feedback Loops (NFBs)
Negative Feed Forward Loops (NFFLs)
Multiple Loops
Examples
- Solutions of Fault-trees
- Common-Mode Failures
- Probability Calculations
- Protective Systems

♦ Event Tree Analysis (ETA)

Part Three Reliability Engineering

♥ Introduction
♥ Failure Models
♥ Qualitative System Analysis
♥ Systems of Independent Components
♥ Component Importance
♥ Markov Models
♥ Counting Processes
♥ Dependent Failures

Part Four Safety-Related Issues in Process Design

♠ Design Principles
- Inherently Safe Processes
- Operability and Controllability
- Fail-Safe Design
- Second Chance Design
- System Size

♠ Design of Alarm/Trip Systems
- Sensor Systems
- Alarm Generation Logic
- Shut Down Unit

♠ Design of Pressure Relief Systems
- Overview
- Relief Sizing
GRADING POLICY

⋆ Project I or Midterm Exam I: 33.3%
⋆ Project II or Midterm Exam II: 33.3%
⋆ Project III or Final Exam: 33.3%

References


