

# SENG - SAFETY ENGINEERING (SENG)

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## SENG 310 Fundamentals of Safety Engineering

**Credits 3. 3 Lecture Hours.** Application of scientific and engineering principles in the selection and design of control systems related to chemical, physical and ergonomic exposures in the process and manufacturing industries; relationships of criteria, analysis and specifications for the assessment and control of occupational related illnesses.

## SENG 312 System Safety Engineering

**Credits 3. 3 Lecture Hours.** Application of system safety analytical techniques to the design process; emphasis on the management of a system safety or product safety program; relationship with other disciplines such as reliability, maintainability, human factors and product liability applications. **Prerequisite:** Junior classification.

## SENG 321 Safety Management Systems

**Credits 3. 3 Lecture Hours.** Concepts of design, operation and maintenance of optimally safe systems, risk management, economic impact, legislation, performance measurement and accident investigation and analysis; principles and practices in industrial hygiene engineering, fire protection engineering and introduction to systems safety engineering. **Prerequisite:** Junior classification.

## SENG 422 Fire Protection Engineering - Facilities Design

**Credits 3. 3 Lecture Hours.** Design of facilities from a fire protection engineering viewpoint including fire detection and fire control systems; materials, equipment, exposures, occupancies and processes; both public and industrial occupancies studied to determine fire protection design specifications. **Prerequisite:** Approval of instructor.

## SENG 430/CHEN 430 Risk Engineering

**Credits 3. 3 Lecture Hours.** Concepts of risk and risk assessment, including use of all available information to provide a foundation for risk-informed and cost-effective engineering practices; examples and exercises from a variety of engineering areas. **Prerequisite:** Junior or senior classification. **Cross Listing:** CHEN 430/SENG 430.

## SENG 440 Material Safety in Semiconductor Manufacturing

**Credits 3. 3 Lecture Hours.** In-depth understanding of hazardous materials commonly used in semiconductor manufacturing processes; focus on the significance of hazardous materials handling and the safe way to do it; safe handling practices, storage requirements, emergency response procedures, and regulatory compliance specific to hazardous materials in semiconductor facilities; modeling and management techniques for different consequences (e.g., toxicity, fire, and explosion). **Prerequisites:** Junior or senior classification.

## SENG 441 Process Safety in Semiconductor Manufacturing

**Credits 3. 3 Lecture Hours.** Comprehensive understanding of chemical process safety principles and practices specifically tailored to the semiconductor manufacturing industry; overview of how to identify and mitigate hazards associated with chemical processes, develop emergency response plans, and gain insights into safety management systems within semiconductor facilities. **Prerequisites:** Junior or senior classification.

## SENG 442 Vapor Phase Techniques for Semiconductor Manufacturing

**Credits 3. 3 Lecture Hours.** Comprehensive understanding of physical vapor deposition (PVD) and chemical vapor deposition (CVD) techniques and their crucial roles in semiconductor manufacturing; understanding of the principles, processes, and applications of PVD and CVD, with a specific focus on mass transport, heat transport, chemistry for CVD, epitaxy, vapor phase exchange, and CVD reactor design; topics include how to distinguish between PVD and CVD methods, effectively choose the most suitable CVD techniques for specific industrial applications, perform calculations related to mass transport, analyze heat transfer mechanisms, anticipate chemical reactions within deposition processes, apply epitaxial growth principles, optimize vapor phase exchange mechanisms, and engineer custom CVD reactor systems tailored to industry requirements; various aspects of semiconductor manufacturing, research, and development; exploration of the efficiency of film deposition processes, exert control over film characteristics, and actively contribute to the continuous advancement of semiconductor technology. **Prerequisites:** Junior or senior classification.

## SENG 455/CHEN 455 Process Safety Engineering

**Credits 3. 3 Lecture Hours.** Applications of engineering principles to process safety and hazards analysis, mitigation, and prevention, with special emphasis on the chemical process industries; includes source modeling for leakage rates, dispersion, analysis, relief valve sizing, fire and explosion damage analysis, hazards identification, risk analysis, accident investigations. **Prerequisites:** Grade of C or better in CHEN 322; senior classification; engineering majors. **Cross Listing:** CHEN 455/SENG 455.

## SENG 460/CHEN 460 Quantitative Risk Analysis in Safety Engineering

**Credits 3. 3 Lecture Hours.** Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students; practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas. **Prerequisite:** Senior or graduate classification. **Cross Listing:** CHEN 460/SENG 460.

## SENG 485 Directed Studies

**Credits 1 to 4. 1 to 4 Other Hours.** Permits students to develop special projects in industrial hygiene engineering, safety engineering or fire protection engineering. Project must be approved by department head.

## **SENG 489 Special Topics in...**

**Credits 1 to 4. 1 to 4 Lecture Hours.** Selected topics in industrial hygiene engineering, safety engineering or fire protection engineering of specific student interest. May be repeated for credit. **Prerequisite:** Approval of instructor.