



Course Title: Functional Safety

Course Length: 2 days with a prior online component, online and in-person

Time Online: 6.5 hours

Time in Class: Day 1: 6.5 hours, Day 2: 7 hours (includes labs)

Time in lab: Day 1: 2 hours, Day 2: 2 hours

Class Size: Minimum 7 / Maximum 12

Price Per Student: \$2,310.00

Location: Genesee County *or* Company Site

Course Description:

Automated vehicles are touted as having the potential to significantly improve the level of safety of their occupants. However, achieving a desirable level of safety is challenging. Fortunately, there are government guidelines and appropriate standards that help with safety. This course covers the most fundamental concepts behind Functional Safety and the ISO 26262 standard while focusing on the development of the Functional Safety Concept.

Lab Projects Description:

Lab Project 1: Development of a Functional Safety Concept for a Brake by Wire System.

Lab Project 2: Development of a Functional Safety Concept for a direct perception controller of an autonomous vehicle.

Course Learning Objectives:

- List and describe the most fundamental ideas of functional safety
- Articulate the concepts of hazard, risk, risk assessment, and risk reduction
- Configure and develop experimental test plans for experimental work
- Perform experiments according to test plans
- Describe the salient features of the ISO 26262 standard
- Explain the characteristics of some safety architectures.
- Develop a Functional Safety Concept for a specific subsystem
- Articulate some current and future applications of in-vehicle network



Course Content/Syllabus:

Online Component (throughout one week):

The courser begins with a one-week online component to be completed prior to classroom instruction. On this week, you'll take a Pre-Assessment to get a baseline of your understanding of the course material. After detailed information on the course, you will get a thorough

overview of the fundamentals of functional safety. This is followed by the characterization of risk by ASIL categories. You will spend time on generating your own ideas about the root cause of accidents and mishaps and how to prevent them. This component will end with a comprehensive assignment to be completed before the classroom instruction.

Topics:

- Knowledge Pre-Assessment
 - Welcome, Course schedule, Course collaboration tools, Learning objectives, Course syllabus.
 - Instructor, Training and delivery methodology, Assignments, Laboratories, Grading and completion criteria.
 - Introduction to course
 - Errors, faults, hazards, accidents, mishaps
 - Risk and risk assessment
 - Risk classification (Automotive safety integrity level: ASIL)
 - Risk reduction
 - Control functions
 - Safety functions
 - Introduction to ISO 26262

Graded Assignment

- Detailed set of questions on Functional Safety fundamentals

Day 1:

On day 1 we review the online content material, answer your questions, and discuss the graded assignment of the online component. You will then get an in-depth coverage of the most important concepts behind functional safety followed by an overview of ISO 26262. You will then be exposed to the product life cycle phases, the V&V diagram, ASIL categories, and the safety culture. Day 1 will end with a comprehensive assignment and completing a laboratory project.

Topics:

- Review of functional safety fundamentals
- Key goals of functional safety
- Overview of ISO 26262
- Product life cycle, V&V diagram



- Understanding ASIL levels
- Key implementation steps
- Safety culture

Graded Assignment

- Read, comment, and summarize a paper on FSC of a Brake by Wire system.

Laboratory Project 1

- Development of a Functional Safety Concept for a Brake by Wire System.

Day 2:

On day 2 we review the day 1 material, answer your questions, and discuss the graded assignment and lab project of day 1. You will then get an in-depth coverage into the development of the Functional Safety Concept. You will then be exposed to various safety architectures and the challenges in the application of ISO 26262. You will then work on a graded assignment and complete lab project 2. Day 2 will end with a course summary, main takeaways, a post assessment, and a course assessment.

Topics:

- Development of the Functional Safety Concept
- Safety Architectures
- Challenges in the application of ISO 26262

Graded Assignment

- Read, comment, and summarize a paper on Safety Architectures.

Laboratory Project 2

- Development of a Functional Safety Concept for a direct perception controller of an automated vehicle.
- Course Summary and Wrap-up
- Course Takeaways

Knowledge Post-Assessment

- Course Assessment

MAGMA short courses are held on a rolling basis, based on industry demand. Please complete this [short form](#) to express interest for yourself, or your organization.