



<b>Course Code</b> 3-120	<b>CEUs</b> 0.6 CEUs
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#### **Course Introduction**

Steel 101 is an introductory course that provides participants with a basic understanding of both the metallurgical and classification of steel and the processes of making of steel. This course covers the following topics: steelmaking and casting in a metalcasting facility, metallurgy and classification, heat treatment of steel, quality control of steel castings, and understanding customer steel specifications. This course serves as a prerequisite for other steel related courses.

#### **Benefits to Taking the Course:**

The benefits of this course include practical and theoretical knowledge for those just entering the industry such as new engineers and those who work directly on the floor of a metalcasting facility. It provides a broad foundation of the processes, treatments, equipment used, safety, and inspection methods of steel castings. It also examines common defects in castings and various testing procedures.

#### **Learning Outcomes**

1. Describe the main principles and features of the steelmaking, metalcasting, and molding processes.
2. Explain the chief properties and types of steel, as well as what distinguishes it from iron.
3. Describe the various heat treatment processes and procedures.
4. Describe inspection methods along with types and causes of steel defects that are identified.
5. Identify industry requirements and standards for inspections and welding repairs.
6. Describe features of chemical and mechanical testing of steel.
7. Explain the importance of fully understanding customer specifications and the role of communications in the specification process.

#### **Lesson Outline**

##### Module 1: Introduction

- Welcome and Facilitator Introduction
- Learning Outcomes, Benefits, and Achieving CEUs

##### Module 2: Steelmaking and Casting in the Metalcasting Facility

- The Steelmaking Process
- Molding Methods

##### Module 3: Basic Metallurgy and Classification of Steel

- The Difference between Steel and Iron
- Crystal Structures, Phases of Steel, and Microstructures
- Grades of Steel
- The Mechanical and Physical Properties of Steel

##### Module 4: Heat Treatment of Steel

- Transformations in Cast Steel
- Heat Treatment Processes
- Heat Treating Procedures

Module 5: Quality Control of Steel Castings

- Safety Requirements
- Defects in Steel
- Steel Casting Specifications, Industry Standards, and Inspection Methods
- Chemical and Mechanical Testing

Module 6: Customer Steel Specification

- Understanding Customer Specs
- Communications and Setting Customer Expectations
- Choosing Castings over Other Processes

Module 7: Conclusion

**Instructional Methods:**

- Situational decision making
- Q & A sessions
- Knowledge checks
- Group activities
- Case studies
- Videos
- Individual activities

**Assessment Methods:**

No formal assessment will take place in this course; however, attendees will participate in informal activities such as knowledge check and Q&A sessions with the facilitator to verify that learning outcomes are being met. Assessment of successful achievement of learning outcomes must be included throughout the course in order to meet the ANSI/IACET 1-2013 standard for continuing education programs and for CEUs to be awarded.

**Attendee Requirements to Earn CEUs:**

1. Present at least 5.5 hours of the total 6 hours of instructional time (90%), which does not include meals or breaks.
2. Active participation (can include asking questions, communicating with other attendees during and taking part in group activities, providing responses during whole class or group discussions).
3. Successful achievement of all learning outcomes.

**Who Should Attend?**

The target audience for this course consists of individuals responsible for:

- Production engineering
- Quality assurance
- Process control
- Technical sales
- Purchasing
- Designing and buying castings
- Management – all levels