Course Syllabus

What you will learn in this course

Manufacturing 1b: Your Path in Manufacturing

We live in a manufactured world. From the chair you're sitting on to each semiconductor in the screen you're looking at, most of the objects in your life came out of a factory. While the knowledge, materials, and skills needed to create these objects are distinct, there are many commonalities in the manufacturing process. Ideas need to be generated, resources need to be managed, and teams need to be led. This course will cover many of these commonalities, including managing resources, product development, operations, testing, teamwork, documentation, and much more. You'll learn both what is involved in the various areas of manufacturing and what a career in different fields would be like. Along the way, you'll do activities that enrich your knowledge and give you the opportunity to delve into the areas that interest you most. A career in manufacturing is a chance to help make the world we live in!

Unit 1: Working with Your Hands and Your Head

There are many career paths in manufacturing which span across various disciplines including business, engineering, and computer science, as well as vocational fields such as welding, machining, and maintenance.

It's incredible how much is done and how many people are involved within this vast industry. In this unit, you'll learn about welding, sheet metal, finishing, and managing the resources that keep production going. At the same time, you'll get a sense of the various careers available within the manufacturing industry. If you already have a sense of which career interests you most, you will see your path more clearly as we progress through the unit. And if you aren't quite sure yet which path is right for you, this unit may soon have you dreaming of an exciting career you can excel in.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Describe the team involved in welding operations
2. Distinguish between machinists, machine operators, and machine programmers
3. Understand the technical requirements of various finishing techniques
4. Prepare to manage gas, liquid, power, and IT resources

Unit 1 Assignments	
Assignment	**Type**
Lesson 01: All Hands on Deck	Lesson
Lesson 02: Sheet Works and Machining	Lesson
Lesson 03: The Finishing Line	Lesson
Lesson 04: Managing Resources	Lesson
Critical Thinking Questions	Submission
Activity 1: How Can I Find Out More About the People Involved in Manufacturing?	Submission
Activity 2: What Do I Hope to Achieve in this Manufacturing Course?	Submission
Activity 3: How Can I Learn How Finishing Techniques Are Used?	Submission
Unit 1 Discussion 1	Discussion
Unit 1 Discussion 2	Discussion
Unit 1 Quiz	Multiple Choice

Unit 2: More Manufacturing Paths

Manufacturing offers a wide range of career opportunities that are both personally and professionally fulfilling. Recent technological advances within the manufacturing sector have led to the launch of new cutting-edge fields, including biotechnology and nanotechnology. Let's take a tour through some more manufacturing career paths, including those that ensure quality, make products, and move things around.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Ensure quality is maintained in a range of areas
2. Prepare the foundations of a product
3. Differentiate between an industrial electrician and a commercial electrician

4. Identify how biological materials are used in improving everyday life

Unit 2 Assignments	
Assignment	**Type**
Lesson 01: Quality Is Key	Lesson
Lesson 02: Preparing the Product	Lesson
Lesson 03:Bringing the Power	Lesson
Lesson 04: Making Life Better	Lesson
Critical Thinking Questions	Submission
Activity 1: Why Do Common Manufacturing Defects Occur?	Submission
Activity 2: How Does Equipment Lift Materials?	Submission
Activity 3: How Does a Manufacturer Perform an Audit?	Submission
Unit 2 Discussion 1	Discussion
Unit 2 Discussion 2	Discussion
Unit 2 Quiz	Multiple Choice

Unit 3: What It Means to Be an Engineer

Have you ever met an engineer? Have you ever wondered what an engineer really does? Engineering is a field of study focused on solving problems and meeting unmet needs using the principles of science and mathematics. Engineers are key team members in many areas of manufacturing from the layout of a plant to the research and development of new technologies. Careers in engineering can be very diverse and provide many opportunities to not only become immersed in creative, theoretical work, but also to participate in transforming a theory into reality.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Describe the impact of civil and environmental engineering
2. Identify areas of manufacturing that a chemical engineer may work in
3. Explain the differences between the main types of engineers in industry
4. Differentiate among the engineers involved in electrical work and computers

Unit 3 Assignments	
Assignment	**Type**
Lesson 01: Building Infrastructure and Protecting the Environment	Lesson
Lesson 02: Chemical and Biochemical Engineers	Lesson
Lesson 03: Industrial and Mechanical Engineering	Lesson
Lesson 04: Electrical Engineering and Computer Science	Lesson
Critical Thinking Questions	Submission
Activity 1: How Are Great Civil Engineering Projects Accomplished?	Submission
Activity 2: What Is in the Future for Manufacturing Specializations?	Submission
Unit 3 Discussion 1	Discussion
Unit 3 Discussion 2	Discussion
Unit 3 Quiz	Multiple Choice

Unit 4: Product Planning

Do you ever look around your house and wonder how things are made? Do you know how football helmets are made or your favorite pair of shoes? Products are constantly being imagined and created to better our daily lives. They solve problems, provide entertainment, and allow us to stay in touch with family and friends. Whatever they may be, all products begin as an idea and are then carefully measured, documented, and researched as they travel from the spark of an idea to store shelves.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Generate ideas in a variety of ways
2. Explain the use of metric and imperial measurements in manufacturing
3. Document product development with blueprints
4. Describe how dimensioning and tolerancing are utilized
5. Execute a plan to develop a product

Unit 4 Assignments	
Assignment	**Type**
Lesson 01: New Product Development	Lesson
Lesson 02: The Measurements Used in Manufacturing	Lesson
Lesson 03: Manufacturing Documentation	Lesson
Lesson 04: Dimensioning and Tolerancing	Lesson
Lesson 05: Project Dynamics	Lesson
Critical Thinking Questions	Submission
Activity 1: How Do I Present My Vision for a Product?	Submission
Activity 2: How Can I Market a Measuring Instrument?	Submission
Activity 3: What Have I Learned So Far?	Submission
Unit 4 Discussion 1	Discussion
Unit 4 Discussion 2	Discussion
Unit 4 Quiz	Multiple Choice

Midterm Exam

1. Review information acquired and mastered from this course up to this point.
2. Take a course exam based on material from the **first half** of the course (**Note:** You will be able to open this exam only one time.)

Midterm Exam Assignments	
Assignment	**Type**
Midterm Exam	Multiple Choice
Midterm Discussion	Discussion

Unit 5: Manufacturing Planning and Management

What is a plan? It's the soil from which a company can grow. As such, it should be tended to carefully before operations begin. It should have a clear vision and enough detail so that there's no confusion about where the company is headed. It's not a document that is set in stone, but it will provide guidance as a company begins operations. Plans guide the decisions companies make on everything from how fast to go to how long-lasting your products will be. Plans can also determine whether the business will make everything themselves or use a contract manufacturer to supply the needed components. Furthermore, they can decide whether the operation will maintain inventory on the shelf or produce items on an as-needed basis. There are many factors that need to be considered and tracked in manufacturing. There's a lot to do, but it all begins with a plan.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Create a business plan
2. Analyze a business based on five performance objectives

3. Outline a general production plan
4. Requisition, store, track, and move inventory

Unit 5 Assignments	
Assignment	**Type**
Lesson 01: Manufacturing Planning	Lesson
Lesson 02: Operations	Lesson
Lesson 03: Production and Manufacturing Plan	Lesson
Lesson 04: Inventory Management and Control	Lesson
Critical Thinking Questions	Submission
Activity 1: What Is the Manufacturing Plan for My Product?	Submission
Activity 2: What "Make or Buy" Decisions Have I Made?	Submission
Activity 3: How Can I Manually Track Inventory?	Submission
Unit 5 Discussion 1	Discussion
Unit 5 Discussion 2	Discussion
Unit 5 Quiz	Multiple Choice

Unit 6: Process Management

When we think of advances in manufacturing, new tools, materials, and products come to mind. Just as important, however, are the documents, processes, and methods that guide the work. Managing a manufacturing operation is complex. It involves careful planning and controlled execution. Fortunately, just as tools and materials have evolved, so have the processes that guide execution. These days, managers have a wealth of tools at their disposal to ensure successful operations, quality products, and the highest customer experience. In a global manufacturing environment, competitiveness is rooted in applying advanced operating approaches like Six Sigma, lean manufacturing, and statistical process control to optimize efficiency, eliminate waste, and maximize financial returns.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Create key operation documents
2. Develop a performance measurement plan
3. Apply statistical process control to a system
4. Select appropriate manufacturing tests

Unit 6 Assignments	
Assignment	**Type**
Lesson 01: Four Key Operations Documents	Lesson
Lesson 02: Operational Efficiency	Lesson
Lesson 03: Quality Assurance and Control	Lesson
Lesson 04: Testing in Manufacturing	Lesson
Critical Thinking Questions	Submission
Activity 1: What Does a Process Flow Sheet Look Like?	Submission
Activity 2: What Resources Can I Use to Learn More About Continuous Improvements?	Submission
Activity 3: How Can I Improve a Process Through a Time and Motion Study?	Submission
Unit 6 Discussion 1	Discussion
Unit 6 Discussion 2	Discussion
Unit 6 Quiz	Multiple Choice

Unit 7: Managing People

Manufacturing is more than machines and processes. People are an integral part to successfully delivering the goods and services consumers enjoy. The workforce for any organization must be skilled in the technologies necessary to efficiently and cost-effectively transform raw materials into finished goods. In addition, companies need people who tend to the business side of operations like sales, marketing, human resources, and accounting. Regardless of the role, there are many non-technical skills that can also be beneficial. These include everything from good listening to working well on a team. In many ways, these skills are equally as important as any technical know-how. They're the skills that allow teams to work together and to lift each other up.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Describe how companies design work systems
2. Identify key skills for success in the workplace
3. Participate positively in a team
4. Explain six common types of leaders

Unit 7 Assignments	
Assignment	**Type**
Lesson 01: All In It Together	Lesson
Lesson 02: Job Skills	Lesson
Lesson 03: Teamwork	Lesson
Lesson 04: At the Helm—Leadership	Lesson
Critical Thinking Questions	Submission
Activity 1: What Job Roles Are Needed to Bring a Product to Life?	Submission
Activity 2: What Questions Are Most Important in a Job Interview?	Submission
Activity 3: How Can I Measure Team Performance?	Submission
Unit 7 Discussion 1	Discussion
Unit 7 Discussion 2	Discussion
Unit 7 Quiz	Multiple Choice

Unit 8: The Big Picture Perspective

Every country in the world employs some form of manufacturing to either provide goods for its citizens or export goods to foreign markets. Regardless of the purpose, the success of a manufacturing operation depends on various factors. To create a successful product, all manufacturing processes must function at an acceptable level from inception to completion. This means an organization must have a clear understanding of how raw materials are sourced and refined, understand how to analyze macro forces, and know how to protect and promote products. This unit will guide you through these big picture factors so that you understand the effect they have on manufacturing companies.

What will you learn in this unit?

After studying this unit, you will be able to:

1. Explain how different raw materials are sourced
2. Map product paths from raw material to the end user
3. Employ a range of economic indicators
4. Describe methods for protecting and marketing products

Unit 8 Assignments	
Assignment	**Type**
Lesson 01: Global Manufacturing Economy	Lesson
Lesson 02: Secondary and Tertiary Tiers	Lesson
Lesson 03: The Economy	Lesson
Lesson 04: Product Protection and Marketing	Lesson
Critical Thinking Questions	Submission
Activity 1: How Can I Make a Poster Presentation for My Product's Global Manufacturing Plan?	Submission
Activity 2: What Have I Learned in this Manufacturing Course?	Submission
Unit 8 Discussion 1	Discussion
Unit 8 Discussion 2	Discussion
Unit 8 Quiz	Multiple Choice

Final Exam

1. Review information acquired and mastered from this course up to this point.
2. Take a course exam based on material from the **second half** of the course (**Note:** You will be able to open this exam only one time.)

Final Exam Assignments	
Assignment	**Type**
Final Exam	Multiple Choice
Final Discussion	Discussion