KMAT-0205 Basic Lathe

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Competencies and Learning Objectives

1. Demonstrate safe and proper setup of a lathe in a machine shop.
   - Identify the basic parts of a lathe: headstock parts, tailstock parts, apron parts
   - Describe and demonstrate safe attire when using a lathe
   - Describe and demonstrate chuck key placement and procedure
   - Describe and demonstrate how to chuck a workpiece
2. Demonstrate proper lathe operation
   - Describe and demonstrate turning on and off the lathe
   - Describe and demonstrate how to set speeds and feeds
   - Describe and demonstrate proper alignment of cutting tool
3. Demonstrate how to turn a workpiece to a specified diameter and length
   - Describe and demonstrate how to qualify the cutting tool to the workpiece
   - Describe and demonstrate how to set your digital read out
   - Describe and demonstrate how to turn a workpiece to a specified diameter and length
   - Describe and demonstrate how to measure diameter and length of a workpiece
4. Identify and define the basic elements of a blueprint
   - Identify and define line styles of a blueprint
   - Identify and define viewpoints of a blueprint
   - Identify and define dimensions of a blueprint
   - Identify and define other key components of a blueprint
5. Interpret and follow a basic blueprint for a lathe project
   - Identify material type
   - Identify project size
   - Determine correct tools to use
   - Follow proper order of operations
6. Demonstrate grinding a cutting tool bit
   - Interpret a cutting tool bit blueprint
   - Demonstrate safe use of a bench grinder
   - Demonstrate grinding proper tool bit relief angles
7. Perform calculations using math for machinists
   - Calculate basic mathematical operations
   - Calculate fractions and decimals
   - Identify and convert units of measure
8. Solve problems using geometry for machinists
   - Solve geometric problems using angles
   - Solve geometric problems using triangles

9. Demonstrate turning major diameter, thread reliefs and chamfers
    - Demonstrate turning a workpiece to blueprint dimensions
    - Demonstrate turning workpiece to class 2A and class 3A threads
    - Demonstrate turning a thread relief
    - Demonstrate turning a chamfer
10. Demonstrate turning a thread
    - Demonstrate turning a 2A thread
    - Demonstrate turning a 3A thread
11. Demonstrate detailing and lubricating a lathe
    - Demonstrate how to detail lathe
    - Demonstrate how to lubricate lathe
12. Describe types and characteristics of manufacturing materials
    - Describe the characteristics of ferrous metals
    - Describe the characteristics of nonferrous metals
    - Describe the characteristics of cutting tool materials
    - Describe the characteristics of heat treated metals

Course Description

This course is an introduction to setting up and using a lathe in a machine shop. Creating cutting tools, interpreting blueprints, and threading will be covered. Math concepts and manufacturing materials will also be covered.

Competencies

Upon completion of the course, you will be rated as MC (Mastered Competency) or NM (Not-Mastered Competency) based on ability to demonstrate the established competencies for the course. You will:

- Demonstrate safe and proper setup of a lathe in a machine shop.
- Demonstrate proper lathe operation.
- Demonstrate how to turn a workpiece to a specified diameter and length.
- Identify and define the basic elements of a blueprint.
- Interpret and follow a basic blueprint for a lathe project.
- Demonstrate grinding a cutting tool bit.
- Perform calculations using math for machinists.
- Solve problems using geometry for machinists.
- Demonstrate turning major diameter, thread reliefs and chamfers.
- Demonstrate turning a thread.
- Demonstrate detailing and lubricating a lathe.
- Describe types and characteristics of manufacturing materials.

Assessment

During the course you be given written and performance exams.

- Lab Final 1
- Lab Final 2
- Lab Final 3
- Lab Final 4
- Lab Final 5
- Written Exam 1
- Written Exam 2

You must pass with at least a score of 80% or higher on each summative assessment to be considered Master Competent and complete the course.

Course work

The course work for this class will be available partially online and partially in the lab. You will need to complete both the online and classroom portions to obtain the all of the course information.

Safety

In this course, you are expected to utilize safe behaviors and safety equipment for a machine shop. Safety will be evaluated in all performance exams.

Flexibility

If you feel that you are ready to do the lab final or exams without completing the course modules, please contact your instructor.

Contact and Assistance

If you need additional assistance with course material, you may consult with your instructor during open lab times Mon-Thur from 5pm to 9pm.

If you have questions about coursework outside of lab hours you may contact your instructor via text/voice 347-920-1047 or email darrell.smith@slcc.edu.

If you have technical issues with Internet access, computer labs, applications, BruinMail, Printing, or software navigate to http://www.slcc.edu/student/help.aspx.

If you have technical issues with Canvas, navigate to https://faculty.slcc.edu/elearning/canvas.aspx.

Syllabus

The expectations for this course are described in detail in the course syllabus. (Link to syllabus)

Course Navigation

In the left navigation bar is a Course Tools menu. It provides information about what tools you need for the course, and how to navigate in Canvas. Start the course with the first module below. You can also click on the Modules link in the left navigation bar to navigate through the course.

Modules

Module 1

Module 1: Overview

Introduction to the Module: This module will introduce you to lathe setup and safety in a machine shop. In this module, you will have access to learning materials and activities using Tooling U, and video demonstrations. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final in Module 6, and Exam 1, to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate safe and proper setup of a lathe in a machine shop.

1. Identify the basic parts of a lathe: headstock parts, tailstock parts, apron parts
2. Describe and demonstrate safe attire when using a lathe
3. Describe and demonstrate chuck key placement and procedure
4. Describe and demonstrate how to chuck a workpiece

Module 1: Tooling U

The learning resources listed below will give you a basic overview of the basic operation of a lathe in a machine shop. It is recommended that you complete all of the Tooling U modules listed below within one week. * Learning modules contain learning material, assignments and a practice quizzes.

Click here to enter Tooling U.

1. Walking and Working Surfaces
2. Metal Removal Process
3. Overview of Engine Lathe Setup
4. Safety for Metal Cutting
5. Metal Fluid Safety

*Note: Modules vary in length so budget your time wisely.

Module 1: Video Demonstrations

Watch the video titled: Grinding a Tool Bit

Information included in this video demonstration

1. How to use a bench grinder
2. How to grind a tool bit side 1
3. How to grind a tool bit side 2
4. How to grind a tool bit side 3

Click this link to view the video.

Module 1: Lab Instructions and Blueprints

The link below will give you access to the Job Traveler instruction sheet and blueprints for the Grinding a Tool Bit lab. You may print a copy to bring to class or keep a digital copy to use during the lab.

Job Traveler- Grind Tool Bit and Blueprint- Grind Tool Bit

Module 1: Lathe Parts Quiz

Once you have reviewed the demonstration video, check your knowledge by taking the Lathe Parts Quiz.

Module 1: Check in Lab 1

Now that you have completed the learning materials for Module 1, check in with your instructor for information about Lab 1: Grinding a Tool Bit.

Module 2

Module 2: Overview

Introduction to the Module: This course will introduce you to the basics of operating a lathe in a machine shop. In this module, you will have access to learning materials and activities using Tooling U, and video demonstrations. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final in Module 9, and Exam 1, to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate proper lathe operation

1. Describe and demonstrate turning on and off the lathe
2. Describe and demonstrate how to set speeds and feeds
3. Describe and demonstrate proper alignment of cutting tool

Module 2: Tooling U

The learning resources listed below will give you a basic overview of basic lathe operation in a machine shop. It is recommended that you complete all of the Tooling U modules listed below within one week. * Learning modules contain learning material, assignments and a practice quizzes.

Click the resource link to get started.

1. Machines for Metal Cutting
2. What is Cutting?
3. Basics of the Engine Lathe

*Note: Modules vary in length so budget your time wisely.

Module 2: Video Demonstration

Watch the video titled: Proper Lathe Operation

Information included in this video demonstration

1. How to turn a lathe on and off
2. How to set speeds and feeds
3. How to align a cutting tool

Click this link to view the video.

Module 2: Feeds and Speeds Quiz

Once you have reviewed the demonstration video, check your knowledge by taking the Feeds and Speeds Quiz.

Module 2: Check in Lab 2

Now that you have completed the learning materials for Module 2, check in with your instructor for information about Lab 2: Proper Lathe Operation.

Module 3

Module 3: Overview

Introduction to the Module: This course will introduce you to the basics of turning a workpiece. In this module, you will have access to video demonstrations. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final in Module 9 and Exam 1, to be taken when you have completed modules 1-6.
The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to turn a workpiece to a specified diameter and length.

1. Describe and demonstrate how to qualify the cutting tool to the workpiece
2. Describe and demonstrate how to set your digital read out
3. Describe and demonstrate how to turn a workpiece to a specified diameter and length
4. Describe and demonstrate how to measure diameter and length of a workpiece

Module 3: Video Demonstrations

Watch the video titled: O.D. Practice Turn A&B Dia's and O.D. Practice Turn C&D Dia's

Information included in this video demonstration

1. How to set the digital read out
2. How to qualify the cutting tool
3. How to measure the diameter and length of a workpiece

Click this link to view the video.

Module 3: Lab Instructions and Blueprints

The links below will give you access to the the Job Traveler instruction sheet and blueprints for the O.D. Practice Turn A&B Dia's and O.D. Practice Turn C&D Dia's labs. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler - O.D. Practice Turn A&B and O.D. Practice Turn A&B blueprint
2. Job Traveler - O.D. Practice Turn C&D and O.D. Practice Turn C&D blueprint

Module 3: Check in Labs 3 & 4

Now that you have completed the learning materials for Module 1, check in with your instructor for information about Lab 3: O.D. Practice Turn A&B Dia's, and Lab 4 O.D. Practice Turn C&D Dia's.

Module 4

Module 4: Overview

Introduction to the Module: This course will introduce you to the basics of operating a lathe in a machine shop. In this module, you will have access to learning materials and activities using Tooling U. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final in Module 6 and Module 10 and Exam 1, to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Identify and define the basic elements of a blueprint.

1. Identify and define line styles of a blueprint
2. Identify and define viewpoints of a blueprint
3. Identify and define dimensions of a blueprint
4. Identify and define other key components of a blueprint

Module 4: Tooling U

The learning resources listed below will give you a basic overview of the elements of a blueprint. It is recommended that you complete all of the Tooling U modules listed below within one week. * Learning modules contain learning material, assignments and a practice quizzes.

Click the resource link to get started.

1. Blueprint Reading

2. Linear Instruments Characteristics

*Note: Modules vary in length so budget your time wisely.

Module 4: Check in

Now that you have completed the learning materials for Module 4, check in with your instructor to move on to the next module.

Module 5

Module 5: Overview

Introduction to the Module: This course will introduce you to the basics of interpreting a blueprint. In this module, you will have access to learning materials and activities using Tooling U. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final in Module 6 and Module 10 and Exam 1, to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Interpret and follow a basic blueprint for a lathe project.

1. Identify material type
2. Identify project size
3. Determine correct tools to use
4. Follow proper order of operations

Module 5: Tooling U

The learning resources listed below will give you a basic overview of the safety expectations in a machine shop. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each learning resource contains learning material and a practice quiz.

Click the resource link to get started.

1. Intro to GD&T
2. Interpreting GD&T

*Note: Modules vary in length so budget your time wisely.

Module 5: Check in

Now that you have completed the learning materials for Module 5, check in with your instructor to move on to the next module.

Module 6

Module 6: Overview

Introduction to the Module: This module will introduce you to grinding forming tools in a machine shop. In this module, you will have access to video demonstrations. You will also

complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final in this Module and Exam 1, to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate grinding a cutting tool bit.

1. Interpret a cutting tool bit blueprint
2. Demonstrate safe use of a bench grinder
3. Demonstrate grinding proper tool bit relief angles

Module 6: Video Demonstrations

Watch the video titled: Grind Forming Tools.

Information included in this video demonstration

1. How to interpret a cutting tool blueprint
2. How to grind a chamfering tool
3. How to grind a threading tool
4. How to grind a part-off tool

Module 6: Lab Instructions and Blueprints

The links below will give you access to the the Job Traveler instruction sheet and blueprints for the Grinding a Tool Bit Lab. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler- Grind Forming Tools 1 and Grind Forming Tools 1 blueprint
2. Job Traveler- Grind Forming Tools 2 and Grind Forming Tools 2 blueprint
3. Job Traveler- Grind Forming Tools 3 and Grind Forming Tools 3 blueprint

Module 6: Check in Lab Final 1

Now that you have completed the learning materials for Module 6, check in with your instructor for information about Lab Final 1: Grinding Forming Tools.

Module 6: Written Exam 1

Once you have reviewed the lecture and Tooling U learning resources, take the exam to see what you have learned.

Module 6: Check in Written Exam 1

Now that you have completed Module 6, check in with your instructor to discuss your Exam results

Module 7

Module 7: Overview

Introduction to the Module: This module will introduce you to the basic math used by machinists. In this module, you will have access to learning materials and activities using Tooling U.

Assessment of competencies in this module will take place in Exam 2, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Perform basic calculations using math for machinists

1. Calculate fractions and decimals
2. Identify and covert units of measure

Module 7: Tooling U

The learning resources listed below will give you a basic overview of the math used by machinists. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each Tooling U module contains learning material and a practice quiz.

Click the resource link to get started.

1. Math: Fundamentals
2. Math: Fractions & Decimals

*Note: Modules vary in length so budget your time wisely.

Module 7: Check in

Now that you have completed the learning materials for Module 7 check in with your instructor if you need additional help with basic math for machinists.

Module 8

Module 8: Overview

Introduction to the Module: This module will introduce you to geometry for machinists. In this module, you will have access to learning materials and activities using Tooling U. Assessment of competencies in this module will take place in Exam 2, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Solve basic problems using geometry for machinists.

1. Solve geometric problems using angles
2. Solve geometric problems using triangles

Module 8: Tooling U

The learning resources listed below will give you a basic overview of the geometry used by machinists. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each learning resource contains learning material and a practice quiz.

Click the resource link to get started.

1. Shop Geometry Overview
2. Geometry: Lines & Angles
3. Geometry: Triangles

*Note: Modules vary in length so budget your time wisely.

Module 8: Check in

Now that you have completed the learning materials for Module 8 check in with your instructor if you need additional help with geometry for machinists.

Module 9

Module 9: Overview

Introduction to the Module: This module will continue to explore the basics of turning on a lathe. In this module, you will have access to learning materials and activities using Tooling U, and video demonstrations. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the lab final at the end of this module and Exam 2, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate turning major diameter, thread reliefs and chamfers.

1. Demonstrate turning a workpiece to blueprint dimensions
2. Demonstrate turning workpiece to class 2A and class 3A threads
3. Demonstrate turning a thread relief
4. Demonstrate turning a chamfer

Module 9: Tooling U

The learning resources listed below will give you a basic overview of turning on a lathe. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each learning resource contains learning material and a practice quiz.

Click the resource link to get started.

1. Toolholders for Turning
2. Cutting Process

*Note: Modules vary in length so budget your time wisely.

Module 9: Video Demonstrations

Watch the video titled: Turn Major Thread Diameters, Thread Reliefs, and Chamfers

Information included in this video demonstration

1. How to turn a workpiece to a blueprint
2. How turn a thread relief
3. How to turn a chamfer

Click this link to view the video.

Module 9: Lab Instructions and Blueprints

The links below will give you access to the Job Traveler instruction sheet and blueprints for Lab 8: Turn Major Thread Diameters, and Lab 9 Turn Thread Reliefs and Chamfer. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler - Turn Major Thread Diameters and Turn Major Thread Diameters blueprint

2. Job Traveler -Turn Thread Reliefs and Chamfer and Turn Thread Reliefs and Chamfer blueprint

Module 9: Check in Lab 8 & Lab 9

Now that you have completed the learning materials for Module 9, check in with your instructor for information about Lab 8: Turn Major Thread Diameters, and Lab 9 Turn Thread Reliefs and Chamfers.

Module 9: Check in Lab Final 2

Now that you have completed the learning materials for Module 9, and labs 8 and 9, check in with your instructor for information about Lab Final 2: Thread reliefs and chamfers exam.

Module 10

Module 10: Overview

Introduction to the Module: This module will finish with the basics of turning on a lathe. In this module, you will have access to learning materials and activities using Tooling U, and video demonstrations. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in the final lab at the end of this module, and Exam 2, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate turning a thread, using the compound.

1. Demonstrate turning a 2A thread
2. Demonstrate turning a 3A thread

Module 10: Tooling U

The learning resources listed below will give you a basic overview of turning on a lathe. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each learning resource contains learning material and a practice quiz.

Click the resource link to get started.

1. Overview of Threads
2. Threading on an Engine Lathe
3. Thread Inspection

*Note: Modules vary in length so budget your time wisely.

Module 10: Video Demonstrations

Watch the video titled: Turn .750-16 Thread and Turn 1.00-8 Thread

Information included in this video demonstration

1. How to turn a 2A/3A thread

Click this link to view the video.

Module 10: Lab Instructions and Blueprints

The links below will give you access to the Job Traveler instruction sheet and blueprints for Lab 10: Turn .750-16 Thread, and Lab 11 Turn 1.00-8 Thread. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler - Turn .750-16 Thread and Turn .750-16 Thread blueprint
2. Job Traveler - Turn 1.00-8 Thread and Turn 1.00-8 Thread blueprint

Assignment: [Module 10: Check in Lab 10]

Now that you have completed the learning materials for Module 10, check in with your instructor for information about Lab 10: Turn .750-16 Thread, and Lab 11 Turn 1.00-8 Thread

Module 10: Check in Lab Final 4

Now that you have completed the learning materials and labs for Module 10, check in with your instructor for information about Lab Final 4: Turning Threads

Module 11

Module 11: Overview

Introduction to the Module: This module will introduce you to the basics of detailing and lubricating a lathe. In this module, you will have access to a video demonstration. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a final lab activity at the end of this module, and Exam 2, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate detailing and lubricating a lathe.

1. Demonstrate how to detail a lathe
2. Demonstrate how to lubricate a lathe

Module 11: Video Demonstrations

Watch the video titled: Detailing and Lubricating a Lathe.

Information included in this video demonstration

1. How to detail a lathe
2. How to lubricate a lathe

Click this link to view the video.

Module 11: Lab Instructions

The links below will give you access to the Job Traveler instruction sheet for detailing and lubricating a lathe. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler - Lathe Detail

Module 11: Check in Lab Final 5

Now that you have completed the learning materials for Module 11, check in with your instructor for information about Lab Final 5: Detailing and Lubricating a Lathe.

Module 12

Module 12: Overview

Introduction to the Module: This module will introduce you to the basics of materials used in manufacturing. In this module, you will have access to learning materials and activities using Tooling U. Assessment of competencies in this module will take place in Exam 2 at the end of this module, to be taken when you have completed modules 7-12.

The course work in this module, combined with class sessions should prepare you to:

Describe types and characteristics of manufacturing materials.

1. Describe the characteristics of ferrous metals
2. Describe the characteristics of nonferrous metals
3. Describe the characteristics of cutting tool materials
4. Describe the characteristics of heat treated metals

Module 12: Tooling U

The learning resources listed below will give you a basic overview of the safety expectations in a machine shop. It is recommended that you complete all of the Tooling U modules listed below within one week. * Each learning resource contains learning material and a practice quiz.

Click the resource link to get started.

1. Intro to Materials
2. Structure of Metal
3. Mechanical Properties of Metal
4. Cutting Tool Materials

*Note: Modules vary in length so budget your time wisely

Module 12: Written Exam 2

Once you have reviewed the lecture and Tooling U learning resources, take the exam to see what you have learned.

Module 12: Check in Written Exam 2

Now that you have completed Module 12, check in with your instructor to discuss your Exam results and completion of the course.