MAC – 222, Advanced CNC Turning

Orientation and Introduction

Introduction

Concept Content:

In this section you will give an introduction of yourself to your class. This is an opportunity to state your relevant experiences and credentials to teach this subject along with your personal background. This can help connecting with students. You can make a video introduction and upload it to this page as well.

Also, this is where you will give a brief overview of the course and what it's contents will be. There is a section later on in this module where you will give more detail about the course.

Course Syllabus

Concept Goals:

Insert the student learning outcomes for the course here.

Concept Content:

This is where you will upload the syllabus. You can do this either by uploading the syllabus text here or you can upload a copy of the syllabus under the resources tab for this section. If you do upload it to the resources, please be sure to give instructions to your students to look for the syllabus there.

Course Resources

Concept Goals:

You can leave this section blank provided you uploaded the student learning outcomes to the previous section.

Concept Content:

This is where you would outline student support resources such as tutoring services, listing your office ours, contact info for support for your college's learning management system, etc. If there are documents you wish to upload, be sure to upload them to the resources tab and give instructions for the students to find the documents there.

Course Overview

Concept Goals:

Student Learning Outcomes:

1. Set up and run a CNC turning center
2. Create a qualified CNC program to create a machine part
3. Operate a CNC turning center to create a complex machine part

Concept Content:

This course covers advanced methods in setup and operation of CNC turning centers. Emphasis is placed on programming and production of complex parts. Upon completion, students should be able to demonstrate skills in programming, operations, and setup of CNC turning centers.

Module	**Module Learning Objectives**
Unit 1 - Week 1 Programing on Y and C Axes	• Define what C-Axis programing is (SLO 2) • Define what Y-Axis programing is (SLO 2) • Input formulas that utilize C-Axis and Y-Axis programing (SLO 2)
Unit 1 - Week 2 Dual Spindles and Toolpaths	• Utilize the G14 code to program a sub-spindle (SLO 2, SLO 3) • Understand how the G14 code works when drafting a lathe program (SLO 2)
Unit 1 - Week 3 Virtual Simulations and Toolpaths	• Be able to describe the design and programming processes in both Mastercam CAD and Mastercam CAM (SLO 2)
Unit 2 - Weeks 4-14 - Projects	• Run a CNC Lathe to create simple projects (SLO 1) • Run a CNC Lathe to create complex projects (SLO 3)
Unit 3 - Week 15 - Final Exam	• Demonstrate knowledge of course concepts

Instructor Note: This is a 15 week course. If you need a 16th week due to your semesters being 16 weeks, you may have to create a 16th week.

Notes/Helpful Tips

Next Steps...

Your Census assignments are REQUIRED in order to remain in the class and they MUST be completed prior to the Census Date **[insert census date here]**. **If you do not have a census date requirement, you can delete this section.**

Effective note taking is also important for not only this course, but for your career as well. Note taking is a great way to retain information. The process of taking notes can keep you alert and focused on the information being presented. It also keeps your mind engaged with what you are hearing, increasing the likelihood you will retain that information. Note taking can also allow you to better organize your thoughts on the information being discussed.

Here is a video that provides some tips for effective note taking.

Unit 1 - CNC Lathe Review/Overview (Weeks 1-3)

Week 1 - Programing on Y and C Axes

Concept Goals:

By the end of this week, you should:

- Define what C-Axis programing is (SLO 2)
- Define what Y-Axis programing is (SLO 2)
- Input formulas that utilize C-Axis and Y-Axis programing (SLO 2)

Concept Content:

Welcome to MAC 222. Before we get to our projects for this semester, we will spend the first three weeks going over some concepts related to machining at this level. This week we will introduce programming on the C axis and review programming on Y axis.

This week's material:

Presentations:

C-Axis Programming Final - 44 Slides

Y-Axis Programming Presentaiton - 19 Slides

Videos:

C Axis-Lathe Example - 1.5 Minutes

Assignment:

Week 1 Quiz - 10 Questions

Week 2 - Dual Spindles and Toolpaths

Concept Goals:

By the end of this week, you should be able to:

- Utilize the G14 code to program a sub-spindle (SLO 2, SLO 3)
- Understand how the G14 code works when drafting a lathe program (SLO 2)

Concept Content:

This week we will discuss dual spindles and tool paths. These are more advanced topics that we are going to cover in this course with the material seen below.

This week's material:

Toolpaths for CNC Lathes - 6 Slides

Dual Spindle Machining Presentation - 35 Slides

Videos:

Use G14 to Program Your Lathe Sub-Spindle - 12.5 Minutes

Setup Tools & Toolpaths on Sub-Spindles - 4.5 Minutes

Assignment:

Week 2 Quiz - 9 Questions

Week 3 - Virtual Simulations and Toolpaths

Concept Goals:

By the end of this week, you should:

- Be able to describe the design and programming processes in both Mastercam CAD and Mastercam CAM (SLO 2)

Concept Content:

This week we will discuss virtual programing and design of parts. This will include overviews of toolpaths and examples of how to program and design using CAD.

Handouts:

2D Virtual Simulatior

2D Toolpath

Another 2D Toolpath

Videos:

Mastercam CAD Tutorial Designing the TITAN 1M - 19.5 Minutes

Mastercam CAM Tutorial Programing the TITAN 1M - 58 Minutes

Assignment:

Submit a two paragraph summary for each of the videos this week detailing what material was covered.

Unit 2 - Projects (Weeks 4-14)

Unit 2 Overview

Concept Goals:

Outline the learning goals for this module here.

Concept Content:

Instructor Note: For this unit you can assign the projects as needed among the students. The next module over will have a bank of projects for you to pick and choose from. Given how students will move at their own pace, there are some more advanced projects in there for those who have the time. You will be responsible for selecting which projects to work on for each student in the order that makes the most sense for them.

This section will have learning materials related to the various projects and what students will be learning from them. There are here in a bank for you to go through with the students as they make sense.

Welcome students to the second part of this class. With the first few weeks of review complete, it is time to work on projects. From here to the end of the semester, we will be tackling various projects in class. They are projects for both the mill and the lathe machines. As there are not enough of either machine for all students to work on a singular project, you will each be assigned projects to work on individually.

Click over to the next module to see the list of projects for the course.

Unit 2 Projects

Concept Goals:

By the end of this module you should:

- Run a CNC Lathe to create simple projects (SLO 1)
- Run a CNC Lathe to create complex projects (SLO 3)

Concept Content:

Here are the blueprints for machining projects for this course. **(Instructor note: this is a bank of potential projects, you can pick and choose which ones you like. There are more projects there than most students would be able to do in one semester).**

Your instructor will assign the projects from this bank of projects.

Projects:

Aluminum Vise

Double Thread

PCC 202-1

Slip Plug

Screw Jack

Simple Turbine Blade

Wheel Spokes

Tiny Stirling Engine

Two Cylinder Oscillating Steam Engine

NIMS CNC Level II CNC Turning

Unit 3 - Final Exam (Week 15)

15.1 Final Exam

Concept Goals:

By the end of this module, you will:

- Demonstrate knowledge of course concepts

Concept Content:

This week is our final exam. To find it, click on the assignments tab and look under quiz.

The exam has 20 questions. **(Instructor note: you can adjust the number of questions by either taking questions off of live mode or even adding questions of your own).**

15.2 Course Wrap-Up

Concept Content:

Thank you for your perseverance through MAC 222 this semester. You have now reached the end of the course. Best of luck moving forward in your studies.

Faculty Resources (For Instructor Only, Do Not Publish Live)

Odigia Guide

Concept Content:

Click on the resources tab to find the guide sheet for instructors.