**CHAMP Course Map**

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| **Course Name:** MAC 262 - Intro to Multi-Axis Lathe  |
| **Instructor Name:** Colorado Community College | **Date:** November 2016 |
| **Course Competencies:** 1. Demonstrate navigation of the Multi-axis lathe controller.
2. Identify common alarm codes for the Multi-axis lathe and demonstrate how to clear them.
3. Demonstrate the understanding for basic theory and technology of Multi-axis lathes.
4. Detect and discern the meaning of programming code particular to Multi-axis lathes.
5. Demonstrate knowledge of tool management in Multi-axis lathes.
6. Demonstrate knowledge of the principles for "one-off" machining and "lights-out" machining in Multi-axis lathes.
7. Demonstrate knowledge of Multi-axis lathe movements and dual spindle concepts.
8. Create a simple G language program (G-code) to run on a Multi-axis lathe.
9. Demonstrate knowledge of various tooling devices for Multi-axis lathes.
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**Course Materials (Text, Edition and any other publisher items)**

**Textbooks and/or Resources:**

| **Module # and Title** | **CCNS Competencies** | **Content, Activities or Challenges****(Learner Interaction** **& Engagement)**  | **Assessments, Rubrics (Feedback)** | **Publish to OER** |
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| Module 1 -**Introduction to Multi Axis lathe capabilities** | 1, 2 | DAY 1 1. Read SL 25ASY M and G Code List
2. Demo power up & power down
3. Samsung SL 25ASY power up and power down procedure Handout
4. Samsung SL 25ASY limitations Handout
5. Loading Tools Handout
6. Demo tool touch off
7. Demo Work coordinate setting
8. Work coordinate setting Handout

DAY 2 1. Demo load unload program via USB
2. Loading and unloading programs Handout
3. Common Alarms
4. Common Alarm Clearing Handout
5. Demonstration of Alarm Clearing

DAY 3 1. Lecture: Machine specs
2. Verify specs

DAY 4 1. Assignment: Hands on competency of week 1 material
2. Videos of multi axis lathe & mill turn
3. DMG MORI NLX 2500SY | 700 Dual spindle lathe - <https://youtu.be/EwYyYXHggp0>
4. DMG MORI NTX2000 - <https://youtu.be/--fHZ7lpEvs>
5. DMG MORI NLX 2500Y | 1250 - <https://youtu.be/VlMqa0iWuCQ>
6. DMG MORI NTX 1000 2nd Generation - <https://youtu.be/G_wcAxVdZgc>
 | Assignment: the machine needs to be set up to run a complete program for the purposes of the student be able to operate and understand it. | * Working Syllabus
	+ Machine Spec Handout
	+ SL 25ASY M and G Code List
	+ Common Alarm Clearing Handout
	+ Samsung SL 25ASY power up and power down procedure Handout
	+ Work coordinate setting Handout
	+ Loading and unloading programs Handout
	+ Loading Tools Handout
	+ Samsung SL 25ASY limitations Handout
* Videos
	+ DMG MORI NLX 2500SY | 700 Dual spindle lathe - <https://youtu.be/EwYyYXHggp0>
	+ DMG MORI NTX2000 - <https://youtu.be/--fHZ7lpEvs>
	+ DMG MORI NLX 2500Y | 1250 - <https://youtu.be/VlMqa0iWuCQ>
	+ DMG MORI NTX 1000 2nd Generation - <https://youtu.be/G_wcAxVdZgc>
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| Module 2 – **Basic theory of multi axis and dual spindle lathe** | 3, 4 | DAY 11. MAC 262 QUIZ 12. C Axis PowerPoint and Transcript3. Y Axis PowerPoint and Transcript1. Machine Mode PowerPoint

DAY 21. Dual Machining PowerPoint and Transcript
2. Read and Discuss M Code List

 DAY 31. Demo setting B axis work2. Demo full program3. Demo adjustmentsDAY 41. Hands on competency of operate full program2. Review concepts of live tools and C axis | * MAC 262 QUIZ 1
* Assignment: the machine needs to be set up to run a complete program for the purposes of the student be able to operate and understand it.
 | * MAC 262 QUIZ 1
* C Axis PowerPoint
* Y Axis PowerPoint
* Machine Mode PowerPoint
* Dual Machining PowerPoint
* Links to videos in PowerPoints
	+ C axis slide 11 - <https://youtu.be/zosrkiBUcXw>
	+ C axis slide 19 - <https://youtu.be/3xcO1-TvRRQ>
	+ C axis slide 22 - <https://youtu.be/upsHGZzY1Ow>
	+ C axis slide 24 - <https://youtu.be/TdDInSF4LyI>
	+ C axis slide 25 - <https://youtu.be/uW3dA-3bM34>
	+ C axis slide 34 - <https://youtu.be/Q52jAAuqNIk>
	+ C axis slide 37 - <https://youtu.be/-e7xDuGXDUs>
	+ Dual spindle slide 14 - <https://youtu.be/Atg6zrrJkcs>
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| Module 3 –**Multi axis program creation** | 7, 8 | DAY 1 1. Lecture: Programming path for .625 Hex with G12.1
2. Lecture: Programming 4 face holes with no Y axis

DAY 2 1. Lecture: Programming path for simple cam path G07.1
2. Lecture: Programming path for .625 with Y axis

DAY 3 1. Lecture: Programming path for 4 face holes with Y
2. Review part hand off and part catcher
3. Review material for mid term

DAY 4 1. Lecture: Lights on machining concepts
2. You tube videos of other machines
* DMG MORI NLX2500SMC/700 - <https://youtu.be/3gsb_CoTE7o>
* DMG MORI NTX2000 - <https://youtu.be/7xHzPYEQcpM>
* DMG MORI NTX2000 Blade - <https://youtu.be/3zDmBcOz4FQ>
* DMG MORI NTX1000 2nd Generation Powertrain connector - <https://youtu.be/-VkCRrC8E6g>
1. Lights Out Machining Handout
2. Midterm
 | * MAC 262 QUIZ 2
* Midterm
 | * Lights Out Machining Handout
* MAC 262 QUIZ 2
* Midterm
* Videos
	+ DMG MORI NLX2500SMC/700 - <https://youtu.be/3gsb_CoTE7o>
	+ DMG MORI NTX2000 - <https://youtu.be/7xHzPYEQcpM>
	+ DMG MORI NTX2000 Blade - <https://youtu.be/3zDmBcOz4FQ>
	+ DMG MORI NTX1000 2nd Generation Powertrain connector - <https://youtu.be/-VkCRrC8E6g>
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| Module 4 –**High volume production with Multi axis lathes** | 5, 6, 9 | DAY 1 1. Review lights out, bar jobs & B axis work
2. Collet pick off math Handout
3. Wait codes and double programs Handout

DAY 2 1. Chuck jaw cutting Handout
2. Emergency collets Handout
3. Programming part trade off Handout
4. Lecture: Programming part catcher

DAY 3 1. Lecture: Common issues with lights out operation
2. Lecture: Air blast and chip flushing
3. Tool management Handout

DAY 4 1. Robots and gantries Handout
2. Open M codes Handout
3. Video examples of robot
* DMG MORI NTX 1000 2nd Generation Connector - <https://youtu.be/G_wcAxVdZgc>
* DMG MORI Best CNC Machine DMG MORI & INDEX R200 MORI SEIKI NT4200 - <https://youtu.be/aTr-8UVl0R0?list=WL>
* MAZAK FF-5000/40 - <https://youtu.be/heStYYjbjZk>
* Mazak iSMART Factory™ Automation Featuring INTEGREX Technology - <https://youtu.be/hP8p4BrY_dQ>
 |  | HANDOUTS1. Air Blast and chip flushing
2. Collet pick up math
3. Chuck jaw cutting
4. Wait codes and Double programs
5. Emergency collets
6. Programming trade off
7. Robots and gantries
8. Tool management
9. Open M codes
10. VIDEOS
11. DMG MORI NTX 1000 2nd Generation Connector - <https://youtu.be/G_wcAxVdZgc>
12. DMG MORI Best CNC Machine DMG MORI & INDEX R200 MORI SEIKI NT4200 - <https://youtu.be/aTr-8UVl0R0?list=WL>
13. MAZAK FF-5000/40 - <https://youtu.be/heStYYjbjZk>
* Mazak iSMART Factory™ Automation Featuring INTEGREX Technology - <https://youtu.be/hP8p4BrY_dQ>
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| Module 5 –**Tests and review** |  | DAY 11. MAC 262 QUIZ3 2. Review week 13. Review week 2 DAY 21. Review week 32. Hands on comp of machine specs3. Hands on comp of tool settingDAY 31. Review week 42. Hands on work setting3. Hands on part catch locate DAY 41. Final | * MAC 262 QUIZ3
* Final
 | * MAC 262 QUIZ3
* Final
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