MET210-100_FA SYLLABUS

Instructor's name: Dave B. Wilson Sr.
Class Meeting:
Location: TEC Building
Phone #: (856) 222-9311 ext. 1052
Schedule at: http://rcbc.edu/eet/faculty,
Email: (preferred) dbwilson@rcbc.edu (I will attempt to respond to emails within 48 hours)
CODE: MET 210
TITLE: CNC Programming I
DIVISION: STEM

COURSE DESCRIPTION:

This course introduces the concepts and capabilities of computer numerical control machine tools. Emphasis will be placed on laboratory work related to set up, operation, and basic applications. Students will explain operator safety, machine protection, data input, program preparation, and program storage.

PREREQUISITE: CSE 110

Number of Credits: 4.0

TEXTBOOK AND COURSE MATERIALS

Machining and CNC Technology, 4/e

Michael Fitzpatrick, Everett Community College--Corporate Education
Keith Smith, Shoreline Community College

ISBN: 1259827445
Copyright year: 2019

It is the responsibility of the student to confirm with the bookstore and/or their instructor the textbook, handbook and other materials required for their specific course and section. Please click on the bookstore for the supplies and textbook price at Rcbc.edu/bookstore.

COURSE LEARNING OUTCOMES:

Upon completion of this course, students will be able to:

- Explain the basic procedures, concepts, measurements, materials, and safety of products and parts of computer numerical control (CNC) operations.
- Identify and understand the basic programming codes.
- Create geometry and toolpaths from specifications on a blueprint for simple parts using Mastercam programming software.
- Identify and define the functions of CNC machine control.
- Set up the CNC machining center for manufacturing simple parts.
- Manufacture simple parts on the CNC manufacturing center individually or as a team.

GENERAL EDUCATION OUTCOMES IN THIS COURSE:

Written and Oral Communication: Communication	* Students will communicate meaningfully with a chosen audience while demonstrating critical thought
Quantitative Knowledge and Skills: Mathematics	* Students will translate quantifiable problems into mathematical terms and solve these problems using mathematical or statistical operations
Scientific Knowledge & Reasoning: Science	*Students will demonstrate critical thinking skills in the analysis of scientific data
Global & Cultural Awareness: Diversity	*Students will be able to explain how communication and culture are interrelated
Technological Competency or Information Literacy: Technology	* Students will demonstrate the skills required to find, evaluate, and apply information to solve a problem

CORE COURSE CONTENT:

Numerical control and computer numerical control (CNC)
• CNC production philosophy and equipment historical perspective
• Types of CNC machine control, coordinate systems- Cartesian and polar
• Basic principles of computer numerical control, absolute and incremental movement, cutting speeds for milling and drilling, drawing basic stock shapes using geometric methods, adding features to the stock, generating tool paths, and generating G-code from the tool paths
• Manufacturing equipment operations, mill operation, lathe operation
• General safety, quality control, housekeeping, and maintenance

COURSE ACTIVITIES:

Course activities vary from course to course and instructor to instructor. Below is a listing of some of the activity's students can anticipate in this course:

- Writing assignments: students will analyze current issues in the field using current articles from the popular press as well as library research including electronic resources databases.
- Speaking assignments: students will present research individually or in groups using current technology to support the presentation (e.g., PowerPoint presentation); students will participate in discussions and debates related to the topics in the lessons. Discussions may also focus on cross-cultural and legal-ethical dilemmas as they relate to the course content.
- Simulation activities: Trends and issues will be analyzed for their ethical as well as social or legal significance. Students might role-play common situations for classmates to analyze. Current news articles may be used to generate discussion.
- Case Studies: Complex situations and scenarios will be analyzed in cooperative group settings or as homework assignments.
- Lectures: This format will include question and answer sessions to provide interactivity between students and instructor.
- Speakers: Representatives from various related fields may be invited to speak.

- Videos: Related topics will provide impetus for discussion.

EDUCATIONAL TECHNOLOGY:

Rowan College at Burlington County advocates a technology enhanced teaching and learning environment. Advanced technological tools may be used in any course section to facilitate instruction. Many of our sections are web-enhanced, which means that some of your work will be submitted or completed online. Web enhancements may include online materials, grade books, testing and quizzes and assignment submission. Many students enjoy the flexibility and convenience that these online enhancements have provided, however if you have concerns about the technology involved, please speak to your instructor immediately.

STUDENT EVALUATIONS:

The student will be evaluated on the degree to which student learning outcomes are achieved. A variety of methods may be used such as tests, quizzes, class participation, projects, homework assignments, research presentations, etc.

See individual instructor's course handouts for grading system and criteria (point value for each assessment component in course, e.g. tests, papers, presentations, attendance etc.), number of papers and examinations required in the course, and testing policy including make ups and/or retests.

GRADING STANDARD:

Final grade computation: 90+ = A, 85+ = B+, 80+ = B, 75+ = C+, 70+ = C, 60+ = D, Below 60 = F.

A Mastery of essential elements and related concepts plus demonstrated excellence or originality.
B+ Mastery of essential elements and related concepts, showing higher level understanding.
B Mastery of essential elements and related concepts.
C+ Above average knowledge of essential elements and related concepts.
C Acceptable knowledge of essential elements and related concepts.
D Minimal knowledge of related concepts.
F Unsatisfactory progress. This grade may also be assigned in cases of academic misconduct, such as cheating or plagiarism, and/or excessive absences.
For other grades, see the current ROWAN COLLEGE AT BURLINGTON COUNTY catalog.

EVALUATION AND GRADING:

Attendance	10%
Design Research projects/Labs	35%
Homework	20%
Test	15%
Final Exam	20%
Total	100%

EXAMINATIONS TIMETABLE:

- Midterm Exam
- Final Exam: Time/date scheduled by the Office of the Registrar at CTS.

ACTIVITIES FOR STUDENTS SUCCESS:

We understand the responsibilities of been a student, therefore I have suggestion a list of learning activities to benefit you:

- Attend class; be punctual; be prepared; pay attention; take notes; follow instructions; study; do assignments; **READ AND PRACTICE THE ASSIGNED MATERIAL**, ***participate in class discussions***; ask questions and seek guidance; set goals/work toward goals; be committed; be organized; be positive (have a good attitude); work to full potential/take pride in your work; be open minded; be creative; be considerate of others; help others/share/network; **BE A TEAM PLAYER**, be considerate of the equipment/facilities; have fun; learn and be honest.

- **Class Participation**

a. Assist or tutor others in or out of class (if you can)

b. Contribute to class discussion (***Instructor notes class participation and may give extra credit for it***)

c. ***Be an active discussion group participant*** while being respectful, courteous and tolerant of others

d. Cell Phone Policy - Please be sure to have your ringer turned OFF so as not to disrupt the Class. You may step outside to the hallway to answer a priority or emergency phone call. **NO TEXTING** in Class.

Assignments - Homework and quizzes will be assigned throughout the semester. Students are responsible for adhering to delivery dates.

Late Work - Any work submitted up to 24 hours past the due date will be subject to a 10% penalty. No work is accepted 24 hours past the due date.

SECTION 3: COLLEGE RESOURCES

College Policies (use verbatim)
In order for students to know their rights and responsibilities, all students are expected to review and adhere to all regulations and policies as listed in the College Catalog and Handbook. These documents can be accessed at http://www.rcbc.edu/publications. Important policies and regulations include, but are not limited, to the following:

- Grading Standards
  - Withdraw (W) and Incomplete Grade (I)
  - Withdrawal date for this semester
- Student Code of Conduct
- Use of Communication and Information Technology
- College Attendance Policy
    - Students are required to attend all class, clinical, laboratory, and studio sessions for the full duration of each such instructional session. Faculty are required to record student attendance, and grade penalties for absence will be imposed when a student exceeds a ten percent non-excused absence rate, not to exceed 10% of the final grade.

- For all on-campus courses, including hybrid and hybrid-mixed-mode on-campus meeting days, excused absences include: suspected COVID-19 related illness (i.e., exhibiting symptoms), tested positive for COVID-19, or demonstrated need to quarantine. For all VLC courses and hybrid and hybrid-mixed-mode virtual meeting days, excused absences include: suspected COVID-19 related illness (i.e., exhibiting symptoms that prevent the student from participating online).
- Students are responsible for informing their instructor as soon as the situation is known and following all other guidelines as outlined by the college. Failure to do so may lead to the absence not being excused. Students are also responsible for communicating with instructors to make reasonable arrangements for the completion of course requirements not completed due to absence.

- Academic Dishonesty/Plagiarism
  - Specifically, the term "plagiarism" includes, but is not limited to, the use by paraphrase direct quotation, of the published or unpublished work or sections of a work of another person without full and clear acknowledgement, whether intentional or not. This includes any material copied directly or paraphrased from the internet. Plagiarism also constitutes the unacknowledged use of materials prepared by another person or agency engaged in the selling of a term papers or other academic materials, including material taken from or ordered through the Internet. For more information on academic dishonesty/plagiarism see Board Policy #903-C.

Office of Student Support and Disability Services (use verbatim)
In accordance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) and the ADA Amendments Act, the Student Support Services Office's mission is to ensure all students with disabilities are provided access to educational and extracurricular activities while on college premises through support in the form of reasonable accommodations such as adaptive technology, counseling, note-taking assistance, and American Sign Language interpreters. Students who have disabilities must self-identify, provide documentation of disability(ies), attend an intake appointment, and sign a Disability Release Form (rcbc.edu/student support) prior to the start of the semester to ensure reasonable accommodations. For more information please contact the Office of Student Support at ext. 1208. For additional information on this policy please refer to the current catalog.

Educational Technology Statement (use verbatim)
Rowan College at Burlington County (RCBC) advocates the use of technology to enhance instruction. Students should assume that classroom and online technology will be used throughout their coursework at RCBC, as it will most certainly be used in their future education and careers. The College provides on-campus facilities for the convenience of the RCBC community. Various college departments, including the Office of Information Technology and the Office of Distance Education, provide technology training and assistance to faculty and students.

Student Success Services (use verbatim)
RCBC offers a variety of free services for its students including those listed below. Descriptions of these services, as well as many others, can be found in the College Catalog and Handbook and on the RCBC website at https://www.rcbc.edu/students.

- **Academic Advising (**https://www.rcbc.edu/advising**)**
- **Struggling Personally or Academically** (https://rcbc.edu/need-help-now)
- **Career Services (**https://www.rcbc.edu/careers**)**

- **EOF (**https://www.rcbc.edu/eof**)**
- **Financial Aid (**https://www.rcbc.edu/financial-aid**)**
- **International Students Office (**https://www.rcbc.edu/internationall**)**
- **ESL Advising & Support (**https://rcbc.edu/esl)
- **Library (**https://www.rcbc.edu/library**)**
- **Office of Veteran Services (**https://www.rcbc.edu/vets**)**
- **RCBC Foundation -Scholarship information (**https://www.rcbc.edu/foundation**)**
- **RCBC bookstore (**https://www.rcbc.edu/bookstore**)**
- **Rowan University Partnership (**https://www.rcbc.edu/rowan**)**
- **Student Support Counseling (**https://www.rcbc.edu/counseling)
- **Tutoring (**https://www.rcbc.edu/tutoring**)**
- **Test Center (**https://www.rcbc.edu/test-center)
- **Transfer Services (**https://www.rcbc.edu/transfer**)**

This syllabus is subject to change at the instructor's discretion.

Course Schedule

MET 210-100_FA202

CNC Programming, I, 2020 Fall Course Schedule

08/28/2020 - 12/17/2020

The course Weeks start on **Thursday (09:00 AM) and end on Tuesdays 11:59 AM).** This schedule allows a week ahead access to the incoming Week. Note, items are subject to change.

Prof. Dave B. Wilson Sr.

Unit	**Deadlines:** **Week Start and End date**	**Week in Review**	**Unit Assignment**	**Project Assignment** **TBD**
Week1 Chapter 1 & 2	Aug 28th to Sept 4th	Advising Package, Schedule, Syllabus Course Project, Academic Success, class outlook and Lecture.	Part1. INTRO TO MANUFACTURING Chpt.1. Professionalism in Manufacturing Chpt.2. Math Skills Self-Review HW	Week 1: Assignment: 1. brainstorming at home research project, build sketches and brief intro summer report. .
Week 2 Chapter 3, 4 & 5.	Sept 4th to Sept 11th	Last Assignment, HomeWorks turned in. Quick review meeting	Chpt. 3. Reading Technical Drawing. Unit 3, 3.1 to 3.3.2 Chpt.4. Introduction to Geometrics. Unit 4, 4.1 to 4.3.2. Chpt.5. Before and after Machining. Unit5, 5.1 to 5.5.5. HW, Quiz 1	Week 2: Complete your project sketch setups. Assignment: 1. Being research on component for your Design Project. Start with using Technical skills, measurement and Code of ethics for instructions using Library Research. 2. Review: Basics Algebra, significant figure, Rounding numbers, Engineering and Scientific Notations (Chapter 2). 3.
Week 3 Chapter 6, 7 & 8.	Sept 11th to Sept 18th	Last Assignment, HomeWorks turned in. Quick review last meeting	Chapter 6. The Science and Skill of Measuring – Five Basic Tools. Unit 6, 6.1 to 6.3.9	Week 3: 1. Gather components and material needed for class project. 2. Setup a working schedule 3. Begin assigning tasks on project.

			Chpt.7. Single – Purpose Measuring Tools, Gages, and Surface Roughness. Unit 7, 7.1 to 7.5.4 PART2. INTRO TO MACHINING Chpt.8. Cutting Tool Geometry. Unit8, 8.1 to 8.4.2. HW	
Week 4 Chapter 9, 10 & 11.	Sept 18th to Sept 25th	Last Assignment, HomeWorks turned in. Quick review last meeting Exchange ideas and plan work on Design Course Project	Chpt.9. Drilling and Operations and Machines. Unit 9, 9.1 to 9.5.3. Chpt.10. Tuning Operations. Unit 10, 10.1 to 10.8.3. Chpt. 11. Mills and Milling Operations Chpt.11, 11.1 to 11.5.10. HW, Quiz 2	Week 4: 1. Complete a full write up of your Project objective, goal and target audience. 2. Start Graphical Drawing of your Project.
Week 5 Chapter 12, 13, 14 & 15.	Sept 25th to Oct 2nd	Last Assignment, HomeWorks turned in. Quick review last meeting	**Quiz in class 1Hr.** Chpt.12. Precision Grinding Operations and Machines. Unit 12, 12.1 to 12.4.5.	Week 5 1. Continue active work on Project.

		Continue work on Course Project construction and exchange ideas and plan work.	Chpt. 13. Screw Thread Technology. Unit 13, 13.1 to 13.2.1. Chpt.14. Metallurgy for Machinists – Heat Treating and Measuring Hardness. Unit14, 14.1 to 14.6.1. HW	
Week 6 Chapter16, & 17.	Oct 2nd to Oct. 9th	Week 6 Last Assignment, HomeWorks turned in. Quick review last meeting Continue work on Course Project construction and exchange ideas and plan work.	Part3. INTRO TO CNC MACHINING Chpt.16. Coordinates, Axes, and Motion. Unit 16, 16.1 to 16.3.3. Cpt. 17. Advanced CNC Systems. Unit 17. 17.1 to 17.5.3. HW, QUIZ 3	Week 6: 1. Continue active work on Project.
Week 7 Chapter 18	Oct 9th to Oct 16th	Week 7 Last Assignment, HomeWorks turned in. Quick review last meeting	**Instructor review Project** CNC Systems Chpt.18. Understanding CNC Axis Drives Unit 18, 18.1 to 18.3.4.	Week 7: 1. Peer review and construction continues 2. Project taking up space, construction in progress. 3. Q & A

		Continue work on Course Project construction and exchange ideas and plan work	HW	
Week 8 Chapter 19, 20	Oct 16th to Oct 23rd	Week 8 Last Assignment, HomeWorks turned in. Quick review last meeting Project collaboration, continue Project construction and exchange ideas and plan work	**Midterm 1** **CNC Controls** Chpt.19. Initializing a CNC Machine (powering up) Unit 19, 19.1 to 19.2.6 Chpt.20. Operating a CNC Machine – Making a Part Unit 20, 20.1 to 20.4.2. HW	Week 8: Team begins to scrutinize and exercising judgement on project 1.
Week 9 Chapter 21	Oct 23rd to Nov 5th	Week9 Last Assignment, HomeWorks turned in. Quick review last meeting Project collaboration, continue Project construction and exchange ideas and plan work.	**Program Planning** Chpt.21. Selecting the Origin (PRZ), Quadrant and Axes Unit 21, 21.1 to 21.3.4. HW	Week 9: 2. Team continues to perform optimization to include power points preparation 3. Testing, interfacing, rehashing presentation. Respond to your peer review, preparing for final presentation

Week 10 Chapter 22	Nov 5th to Nov 12th	Week 10 Last Assignment, HomeWorks turned in. Quick review last meeting Project collaboration continue Project construction and exchange ideas and plan work.	Chpt.22. Level 1 Programming – Manually Compiling Program Commands Unit 22, 22.1 to 22.5.5. HW, QUIZ 4	Here Full opportunity to experiment with exercises, makeups, improve on class research project or left over.
Week 11 Chapter 23	Nov 12th to Nov 19th	Starting this week, I may have extra simulation software application for some CNC on Computer.	***Level II Programming*** (adding computer logic to hand compiled programs) Unit 23, 23.1, to 23.3	Project Troubleshooting
Week 12 Chapter 24	Nov 19 to Nov 26		Chapter 24 Setting Up a CNC Machine to Run Unit 24, 24.1 to 24. 3.2	PRESENTATION!!! Project, and all resources optimized for Presentation.

Week 13 Tolerance (Time to catchup or complete due to delay)	Nov 26 to Dec 3rd		More exercises on SolidWork Reviewing for Mid Term Exam	Satisfied, Schedule Presentation and Rehash Presentation.
Week 14	Dec 3rd to 10th	ALL ASSIGNMENTS, HW, WORKS TURNED IN.	Midterm Exam !!!!	PRESENTATION
Week 15 OKAY!				

This schedule is subject to change. DW FA2020