Manufacturing Processes Lecture/ Lab – Fall 2018
Course #: MFG 102, CRN XXX/XXX

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Class Hours: Tuesday 8:00 – 12:15AM Room B108

Office Hours:
M 2:00 – 3:00PM
T 2:30 – 3:30PM
W 2:00 –3:00PM
R By Appointment

Required Text:

- Introduction to Manufacturing Processes – Groover, Mikell P., Oct 2011/12 ISBN : 978-0-470-63228-4

Course Description:

This course studies manufacturing: making goods and wares by industrial processes. The course will provide theoretical experience in the scientific, engineering, and economic principles on which the various manufacturing processes are based. This course provides laboratory emphasis on common metal cutting tools and lathe operations, as well as on associated precision measuring tools and instruments. The labs will involve set-ups and procedures for milling machines, lathes, grinders, drill presses, and some measuring instruments.

Lecture & Lab Outcomes:

- Students will practice the skills needed to work effectively in teams and as an individual.
- Students will demonstrate the ability to use appropriate mathematical and computational skills needed for engineering technology applications.
- Students will combine oral, graphical, and written communication skills to present and exchange information effectively and to direct manufacturing activities.
- Students will know of a professional code of ethics.
- Students will describe concepts relating to manufacturing quality, timeliness, and continuous improvement
- Students will describe how the concepts of metal manufacturing, statistics, process automation, computer-aided design and manufacturing, and organizational management affects manufacturing operations.
- Students will illustrate an ability to think critically and identify, evaluate and solve complex technical and non-technical problems; demonstrate creativity in designing problem solutions; and conduct and interpret experimental data and outcomes.
- Students will recognize the need to be lifelong learners.

The course will consist of a lecture and a lab. This course is taught using a variety of instructional methods that might include lecture, class discussion, small group work, project creation, electronic discussion, and group presentations. In both the lecture and lab, open student discussion is encouraged including the asking of questions and relating their own experiences.

Lecture & Lab Performance Criteria:

The above outcomes will be assessed using these performance criteria:

- Working in teams –
  - Produce research information for a team
  - Demonstrate understanding of team roles when assigned
  - Share in work of team
  - Demonstrate good listening skills
- Mathematical and computational skills-
  - Ascertain problem conditions by identifying known and unknown quantities in formulating a problem for solution
  - Demonstrates the correct selection and application of pertinent formulae, principles and concepts
  - Pursue solutions in a methodical, logical manner with results correctly explained with sufficient detail and properly documented
  - Submit problem solutions with a minimum of computational errors, identifying and selecting the correct dimensional units
- Use of communication skills-
  - Identify the reader / audience, assess their previous knowledge & information needs, and organize / design information to meet these needs
  - Provide content that is factually correct, supported with evidence, explained with sufficient detail and properly documented
  - Test reader / audience response to determine how well ideas have been relayed
  - Submit work with a minimum of errors in spelling, grammar & usage
- Know Code of Ethics-
  - Demonstrate knowledge of professional code of ethics / conduct
  - Evaluate the ethical dimensions of professional engineering, mathematical and scientific practices
- Concepts relating to manufacturing quality, timeliness, and continuous improvement-
  - Identify the factors that influence manufactured products quality, cost, and timeliness
  - Demonstrate familiarity with concepts of 'waste' and waste reduction processes as related to manufacturing
  - Determine systems required to ensure products / services are designed & produced to meet / exceed customer requirements
  - Apply the fundamentals and concepts of lean, just-in-time and Kanban during manufacturing system design
- Describe how the concepts affect manufacturing operations-
  - Identify the elements of manufacturing automation commonly found in manufacturing enterprises; including CAD/CAM, CNC, machine vision & automated inspection, automated material handling and storage, and robotics
  - Demonstrate familiarity with typical manufacturing processes – integrated manufacturing systems
  - Show knowledge of key drivers of manufacturing system performance
  - Perform geometric modeling using CAD software; prepare a simple CNC program and produce a sample part
- Illustrate an ability to think critically and identify-
  - Show the ability to evaluate the credibility of sources of information
  - Demonstrate the ability to refine generalization, establish rational & pertinent assumptions, and avoid oversimplifications
  - Exhibit the ability to generate, analyze / evaluate, and assess multiple engineering problem solution options
  - Produce documentation that reflects organization and application of engineering principles in specifying solution to an engineering problem
- Lifelong learning-
  - Demonstrate an awareness of what needs to be learned; formulate questions based on research need
  - Develop research plan appropriate to the investigative method
  - Identify, retrieve and organize information
  - Use a variety of methods and emerging technologies to keep current in the field

Grading Policy:

It is usually expected that students will spend approximately 2 hours of study time outside of class for every one hour in class. Since this is a 3 credit class, you should expect to study an average of 6 hours per week outside of class. Some students may need more outside study time and some less. Two exams will be given during the semester with the possibility of quizzes as appropriate. Approximately one hour of the class meeting will be devoted for each exam. Final grades will be based on a normal distribution of all students taking the course based on the following weighting:

COMPONENT	WEIGHTING	DUE DATE
LearnMate1: Blueprint Reading	10%	18 Sep
Lab Report 1: Molding	10%	02 Oct
Exam I	10%	23 Oct
LearnMate2: Mechanical Measuring and Quality Control	10%	30 Oct
Ethics Case Study	10%	06 Nov
Lab Report2: Hammer	10%	13 Nov
LearnMate3: Intro to Advanced Manufacturing	10%	04 Dec
Final Presentations	10%	04 Dec
Lab Report 3: Phone Caddy	10%	12 Dec
Exam II	10%	12 Dec

Grading Distribution: Grades will be assigned according to the following scale:

A	94-100	C	73-76
A-	90-93	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	0-59

Attendance/Participation: Each student is expected to attend every class. This course is designed in such a way that a student should get more from the in-class activities than from the textbook alone. If you miss a class, it is your responsibility for obtaining notes, handouts and assignments. If you cannot attend a lecture due to extraordinary events, notify the instructor in advance of the class that will be missed. Unless special arrangements have been made with the instructor in advance, the due date for the coursework will remain as indicated.

Disabilities Statement: Students with disabilities are guaranteed reasonable accommodation under the provisions of the Americans with Disabilities Act of 1992. Disclosure of a disability must be voluntary and initiated by the student. For further assistance, please contact Matt Liscum in the Office of Disability Services at 860.215.9265 or mliscum@threerivers.edu. Please note that an instructor cannot provide disability accommodations until a student provides the necessary paperwork from the college's Office of Disability Services.

Academic Integrity: Academic integrity is essential to a useful education. Failure to act with academic integrity severely limits a person's ability to succeed in the classroom and beyond. Furthermore, academic dishonesty erodes the legitimacy of every degree awarded by the College. In this class and in the course of your academic career, present only your own best work; clearly document the sources of the material you use from others; and act at all times with honor.

Plagiarism: Plagiarism is the unacknowledged use of another person's work or ideas in your writing. It is often known as copying word-for-word. However, even paraphrasing without acknowledgement or using the ideas of peers garnered from class discussion or a study group is considered plagiarism. Whether it is conscious or unconscious, plagiarism is a serious academic offense. Your writing for this course, and any other course at TRCC, is expected to be original, and the product of your own thinking. A student who has plagiarized will receive a ZERO on his/her assignment and may be reported to the Academic Dean and/or Student Services Dean for disciplinary action.

Technology Statement: The use of cell phones or other technological devices is not permitted during class time, unless deemed appropriate by the instructor.

Electronic Learning Portfolios: All students are required to maintain an online learning portfolio in Digication that uses the college template. Through this electronic tool students will have the opportunity to monitor their own growth in college-wide learning. The student will keep his/her learning portfolio and may continue to use the Digication account after graduation. A Three Rivers General Education Assessment Team will select and review random works to improve the college experience for all. Student work reviewed for assessment purposes will not include names and all student work will remain private and anonymous for college improvement purposes. Students will have the ability to integrate learning from the classroom, college, and life in general, which will provide additional learning opportunities. If desired, students will have the option to create multiple portfolios.

Email: Correspondence by email is considered a method of formal communication. Emailing an instructor is not the same as emailing or texting a friend. Please use a proper salutation, complete sentences, punctuation, proper spelling and identify yourself by name in the body of the email. **Students must use their college issued email account. College issued email is the official mode of communication used by the college to contact students.**

Class Cancellation: To determine if the college is closed, please visit the TRCC webpage at http://www.trcc.commnet.edu/ and/or sign-up for notification through MyCommNet ALERT.

College Withdrawal Policy: Course withdrawals are accepted up until the week before classes end. Withdrawal forms are available online or at the Registrar's office. The withdrawal does not have to be signed by the instructor but it is strongly advised that you speak with your instructor before withdrawing. If necessary, you can withdraw over the phone by calling the Registrar's Office at 860.215.9064. Emails and faxes are also accepted. If you are receiving financial aid, it is strongly recommended that you contact the Financial Aid Office before withdrawing. Withdrawal may affect your financial aid for current and/or future semester(s). It is your responsibility to confirm that the withdrawal has been received.

The last day to withdraw from the Fall 2018 semester is December 9, 2018

Class Schedule (subject to change at instructor's discretion):

Date	Topic	Reading	Lab	LearnMate	Due
8/28	Intro./Lab Safety		LearnMate Setup	Blueprint Reading	
9/4	Intro. to Manufacturing	Ch. 1	Object Perspective	Blueprint Reading	
9/11	Dimension/Tolerance	Ch. 4	Metrology	Blueprint Reading	
9/18	Material Properties	Ch. 2, 3	Silicone Molding	Blueprint Reading	LM1
9/25	Plastics / Elastomers	Ch. 8, 9	Silicone Molding		
10/2	Material Removal (Mechanical)	Ch. 15, 16, 17	Hammer	Mechanical Measuring, Quality Control	LR1
10/9	Material Removal (Other)	Ch. 18, 19	Hammer	Mechanical Measuring, Quality Control	
10/23	**Exam 1**		Hammer	Mechanical Measuring, Quality Control	
10/30	Ethics	Handout	Case Study	Mechanical Measuring, Quality Control	LM2
11/6	Production Systems (Lean / Six Sigma)	Ch. 15, 16, 17	Hammer		CS
11/13	Metal Forming	Ch. 12, 13	S/M Layout	Advanced Manufacturing	LR2
11/20	Sheet Metalworking	Ch. 14	S/M Layout	Advanced Manufacturing	
11/27	Mechanical Assembly	Ch. 25	Phone Caddy	Advanced Manufacturing	
12/4	Catch-Up/Final Presentations		Phone Caddy	Advanced Manufacturing	LM3
12/11	Final Exam				

FALL 2018 Standard 15 Week Session

Aug 27	Registration deadline and last day to drop classes for full tuition refund
Aug 28	Classes begin, add and drop periods begin
Sep 3	**Labor Day - college closed *and*** last day for registered students to add a class - online **(Aug 31 in person)**
Sep 4-7	Welcome Week
Sep 10	Last day to drop classes and partial tuition refund
Sep 17	Constitution Day observed (classes in session)
Sep 21	Professional Day (classes in session)
Sep 25	Last day to select audit option
Oct 16	Reading Day *See Additional Notes
Nov 1	Continuing Degree-Seeking Student Registration for Winter '18 Intersession and Spring '19 Semester Advising day (classes in session)
Nov 5	Advising day (classes in session)
Nov 6	Last day to select pass/fail option, last day to submit incomplete work from Spring '18 and Summer '18
Nov 15	New Student and Non Degree-Seeking Student Registration for Winter '18 Intersession and Spring '19 Semester, and last day to apply for spring graduation (May '19)
Nov 21	College open - no classes in session
Nov 22-25	**Thanksgiving recess**
Dec 9	Last day to withdraw from classes - online **(Dec 7 in person)**
Dec 16	Last day of 15 Week Session
Dec 21	Final grades due to Registrar's office
Dec 24	Grades available on web
Dec 25	**Christmas Day - college closed**

LearnMate (10% Each): https://trlm.trcc.commnet.edu

Mechanical Blue Print Reading (DUE 18 Sep.) Enrollment Key: Draw18

1. Identifying Lines and Their Functions
2. Single, Multiple, and Auxiliary View
3. Reading and Locating Blue Print Dimension
4. Determining Tolerances
5. Identifying Thread Dimension
6. Identifying Tapers and Machine Surfaces
7. Cutting Plane and Sections
8. Geometric Dimensioning, Wear Limits, and Assembly Drawings
9. Identifying Welding Symbols
10. Reading Plot Plans
11. Reading Footing, Foundations, and Floor Plans
12. Reading Concrete and Structural Steel Prints
13. POST TEST

Mechanical Measuring & Quality Control (DUE 30 Oct.) Enrollment Key: Measure18

1. Getting Started
2. Accuracy, Precision and Measuring Tools
3. Units of Measurement and Conversion Tooling
4. Fractions, Decimals, and Rounding
5. Scaled Measurement Tools
6. Vernier, Dial, and Digital Calipers
7. Micrometers
8. Height Gauges and Dial Indicators
9. Fixed Gauges
10. Transfer Measurement Tools
11. Statistical Analysis
12. Statistical Process Control
13. Nominal Dimensions and Tolerance
14. Parts Inspection and Inspection Reports
15. Conclusion
16. POST TEST

Introduction to Advanced Manufacturing (DUE 4 Dec.) Enrollment Key: Advanced18

1. Introduction
2. Careers in Manufacturing
3. Seeking a Manufacturing Career
4. The Manufacturing Company
5. Planning and Staffing a Manufacturing Company
6. Manufacturing Processes
7. Computers in Manufacturing
8. Automation in Manufacturing
9. The Arrow Plane
10. POST TEST

Lab Reports (10% Each):

1. Molding (Due - 02 Oct.)
2. Hammer (Due - 13 Nov.)
3. Phone Caddy (Due - 12 Dec.)

Lab Report Format (3-5 Pages)

I. **Cover Page** (Include Title, Student Name, Course Name, & Date)

II. Introduction

III. Bill Of Materials / Tools Needed

IV. Objective

a. Describe in one to two sentences the purpose of the laboratory exercise. This section should include why the lab was conducted.

V. Procedures

a. Describe what steps and methods were used in order to accomplish the laboratory exercise.
b. What order of operation was required to produce the outcome?
c. Why were these steps accomplished in this order?

VI. Results

a. How did the finished product of the lab compare to the expected outcomes?
b. What could have been done differently in the procedures in order to produce a better outcome?

VII. Conclusion

a. Consider mass production of these parts, could the part be modified or designed differently in order to produce larger quantities at a more rapid rate of production with a high yield of parts within specification?

VIII. References

Case Study (10%)

Incident at Morales:

Case Report Format (5 Pages)

I. **Cover Page** (Include Title, Student Name, Course Name, & Date)

II. Introduction

a. Describe the situation at Phaust Chemicals. Layout the main characters, the major project deliverables, and the major project constraints.

III. **Problem Statement** (use the Incident at Morales handout to assist with possible questions to answer for this portion of the case study)

a. As a result of the project constraints, what ethical issues arose (list these issues from most important to least important)?
b. How did the decisions made for each of these ethical issues affect the outcome of the project (internal/external stakeholders, environment, etc…)
c. Whose responsibility should it have been to ensure that the 'right' thing was done when these issues arose?

IV. Conclusion

a. What have you learned about engineering ethics?
b. Should governments be more involved by putting additional laws/regulations in place to mandate the 'appropriate' choices be made by individuals and organizations?
c. How will you conduct yourself as a 'professional' someday?

V. References

Presentation (10%):

Presentation (5-10 Minutes)

I. **Cover Slide** (Include Title, Student Name, Course Name, & Date)

II. Introduction
a. Give a quick overview of the process to be discussed.

III. History
a. When was the process developed?
b. Who developed it?
c. How has this process impacted history?

IV. Description
a. General description of how the process works?
b. What are the process limitations (what materials can/cannot be processed, quantities are produced, tolerances can be held, etc.)?
c. What types of materials/products are produced using this process?

V. Future / Conclusion
a. What advancements do you anticipate for this process? Be imaginative!
b. Provide a summary of what you just presented.

VI. References Slide