A. **Academic Division:** Technology and Workforce Development

B. **Discipline:** Manufacturing

C. **Course Number and Title:** MFGT1110 – Manufacturing Processes

D. **Course Coordinator:** Chris Barker  
   **Assistant Dean:** Daniel Wagner

Instructor Information:

- **Name:** Click here to enter text.
- **Office Location:** Click here to enter text.
- **Office Hours:** Click here to enter text.
- **Phone Number:** Click here to enter text.
- **E-Mail Address:** Click here to enter text.

E. **Credit Hours:** 3  
   Lecture: 2 hour  
   Laboratory: 2 hours

F. **Prerequisites:** None

G. **Syllabus Effective Date:** Fall, 2017

H. **Textbook(s) Title:**

   *Modern Materials and Manufacturing Processes*
   - **Author:** Bruce, Dalton, Neely, Kibbe  
   - **Year:** 2003  
   - **Edition:** 3rd  
   - **ISBN #** 9780130946980

I. **Workbook(s) and/or Lab Manual:** Provided by Instructor

J. **Course Description:** This course offers an introduction to manufacturing methods and basic machine tool operation. Students will be provided the background needed to read and interpret technical drawings and proper use of a variety of inspection and measuring tools. Students will also develop and use shop documents such as job plans and blueprints. Diligent attention is given to safety in the modern manufacturing environment.

K. **College-Wide Learning Outcomes:**

<table>
<thead>
<tr>
<th>College-Wide Learning Outcome</th>
<th>Assessments - - How it is met &amp; When it is met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication – Written</td>
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<td>Communication – Speech</td>
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<tr>
<td>Intercultural Knowledge and Competence</td>
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<tr>
<td>Critical Thinking</td>
<td>Information Literacy</td>
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L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Assessments – How it is met &amp; When it is met</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate proficiency in safety regulations.*</td>
<td>Week one and throughout semester:</td>
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<tr>
<td>2. Demonstrate proficiency in interpreting industrial drawings and blueprints.</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>3. Demonstrate proficiency in the use of measuring instruments.*</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>4. Operate Machine Tools accurately and in accordance with OSHA safety regulations.</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>5. Demonstrate accurate layouts to print specifications, following OSHA chemical handling safety procedures.</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>6. Demonstrate application of math skills to lab and lecture assignments and apply empirical data to determine speeds and feeds to optimize production efficiencies.*</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>7. Demonstrate ability to locate information.</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>8. Distinguish between different manufacturing processes such as forgings, extrusions, castings, forming, and finishing.*</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>9. Demonstrate an understanding of the interrelationships between material properties and manufacturing processes.*</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
<tr>
<td>10. Distinguish between different fabrication processes such as welding, fasteners, and adhesives.*</td>
<td>Lab projects and activities, guided notes in workbook, homework and Exams.</td>
</tr>
</tbody>
</table>

*indicates a TAG outcome

M. Topical Timeline (Subject to Change):

Week 1  COURSE ORIENTATION   Workbook PART I   VIDEO MAKING STUFF STRONGER  
SAFETY ORIENTATION: CHEMICAL SAFETY, MSDS, AND PPE INSTRUCTION TO BE FOLLOWED FOR ALL LABS

Week 2
- The Atomic Structures of Materials
- Properties of Metals
  - Materials Lab – file, drill, weigh, magnet test, conductivity test, & Rockwell test provided samples

Week 3
- Changing the Properties of Metals
- Mining and Extraction of Metals
  SHORT VIDEOS:  
  Steel manufacture: A Virtual Tour
Steel From Start to Finish
Steelmaking
Stainless steel
Alloy wheels
Bearing assemblies
Aluminum pots
Surgical tools
Hammer production

Week 4
- Extraction and Refinement of Common Nonmetallic Materials
- Selection and Application of Materials
  SHORT VIDEOS:
  - Forging and ring rolling
  - Blow molding
  - SME injection molding
  - Cutlery
  - Die casting
  - Steel pipe analysis
  - Spectral analysis of metals

Week 5
Workbook PART II
- Design Specs and Process Capability
  - Rapid Prototype Lab: GUEST DEMO
  - SPC inspection and charting lab
    - Calculate Mean, Standard Deviation. Complete data collection and charts required
- Processing by CASTING
- Processing by HOT WORKING
  - Hot Forming Lab

Week 6
- Processing by COLD WORKING
- Powder Metallurgy
- Principles of Machining
  - Drill Press Lab – Saw and file blanks square.
    - Dye part and layout holes with scribe and scale.
    - Locate information from charts to Identify tap drills and taps per print spec.
    - Calculate RPM and Feed rates for various HSS tooling and set machine accordingly.
    - Use measuring tools including height gage, micrometers and dial calipers.
    - File and check corner radii with radius gage
- Machine Tool Operations
- Grinding wheels

Week 7
- Milling Lab -- Prep parts for CNC project (name plate)
  - Locate information from charts to Calculate RPM and Feed rates for various HSS tooling
  - Use measuring tools including height gage, micrometers and dial calipers.

Week 8
- Turning on a Mandrel Lab (pen kits)
  - Locate information from charts to Calculate RPM and Feed rates for various HSS tooling and set machine accordingly.
  - Use measuring tools including height gage, micrometers and dial calipers.

Week 9
- Non-Traditional Manufacturing Processes
- Joining Processes
  - Adhesives, Plastic Welding, Fasteners, and Riveting lab
    - Prepare parts for assembly according to print specs.
- Locate information from charts to identify tooling and calculate RPMs for drilling and tapping according to print specs.
- Assemble components according to print specs for fasteners, adhesives, riveting, or welding according to print specs.

- Plastics and Composites
  - Accurately measure and mix chemicals to fabricate SILICON MOLD.
  - Accurately measure and mix chemicals to complete RESIN mix and pour.

- Other Industrial Materials
- Corrosion and Protection of Materials

Week 10
- Glass Etching Lab
  - Cut etching template.
  - Apply template using specified adhesives.
  - Accurately measure and mix etching chemicals to composite materials.
  - Dispose of contaminated material according to EPA specs.

Week 11
  Workbook Pages PART III
- Quality Assurance

Week 12
- Inspection and Measurement

Week 13 and 14
- CNC MILLING LAB
  - Calculate Cartesian Coordinates for Name Plate programming project.
  - Load Part according to programmed instructions.
  - Use measuring tools including height gage, micrometers and dial calipers.

Week 15
  Workbook Pages PART IV
- Product Design
  - Engineering Design Project
    - Use measuring tools to create model of design project.
    - Calculate dimensions for box pattern.
    - Design, print, and cut model, then assemble using appropriate adhesives.

- Automation
  - Robotics lab: GUEST DEMO

Week 16
- Comprehensive Final Exam
- Build a wind farm
  - Design blades for model turbine.
  - Calculate geometry for optimum design efficiency.
  - Use layout tools, adhesives, rivets, etc. to assemble turbine blades per design.
  - Use meters to test and record amps and volts.
  - Calculate watts according to provided formula.

N. Course Assignments:

1. Fabricate projects from technical drawings using the lathe, mill, drill press and layout tools to print specifications. Students will use carbide tooling, machine tools and accessories including drill jigs in the lab setting. Student will follow safety rules.
2. Wear PPE’s including work shoes appropriate for machine shop environment and OSHA approved side shields for those students wearing prescription glasses.
3. Use scientific calculator and Shop Reference for Students and Apprentices to determine speeds and feeds and optimize efficiency.
4. Complete ALL LABS, according to schedule, using MSDS and appropriate safety provisions.
5. Complete written homework assignments, scheduled tests, and Final Exam as scheduled.

O. Recommended Grading Scale:
<table>
<thead>
<tr>
<th>NUMERIC</th>
<th>GRADE</th>
<th>POINTS</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>93–100</td>
<td>A</td>
<td>4.00</td>
<td>Superior</td>
</tr>
<tr>
<td>90–92</td>
<td>A-</td>
<td>3.67</td>
<td>Superior</td>
</tr>
<tr>
<td>87–89</td>
<td>B+</td>
<td>3.33</td>
<td>Above Average</td>
</tr>
<tr>
<td>83–86</td>
<td>B</td>
<td>3.00</td>
<td>Above Average</td>
</tr>
<tr>
<td>80–82</td>
<td>B-</td>
<td>2.67</td>
<td>Above Average</td>
</tr>
<tr>
<td>77–79</td>
<td>C+</td>
<td>2.33</td>
<td>Average</td>
</tr>
<tr>
<td>73–76</td>
<td>C</td>
<td>2.00</td>
<td>Average</td>
</tr>
<tr>
<td>70–72</td>
<td>C-</td>
<td>1.67</td>
<td>Below Average</td>
</tr>
<tr>
<td>67–69</td>
<td>D+</td>
<td>1.33</td>
<td>Below Average</td>
</tr>
<tr>
<td>63-66</td>
<td>D</td>
<td>1.00</td>
<td>Below Average</td>
</tr>
<tr>
<td>60-62</td>
<td>D-</td>
<td>0.67</td>
<td>Poor</td>
</tr>
<tr>
<td>00-59</td>
<td>F</td>
<td>0.00</td>
<td>Failure</td>
</tr>
</tbody>
</table>

P. **Grading and Testing Guidelines:**

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Q. **Examination Policy:**

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R. **Class Attendance and Homework Make-Up Policy:**

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S. **Classroom Expectations:**

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T. **College Procedures/Policies:**

**Attendance Requirements:** All students are required to attend all scheduled classes and examinations. Each faculty member has the right to establish regulations regarding attendance that he/she considers necessary for successful study.

Students who do not attend classes may be administratively withdrawn from those classes. However, failure to attend classes does not constitute withdrawal, and students are expected to process a formal withdrawal through the Student Records Office in Kee Hall.

**Student engagement requirements:**
Student engagement is based on the “active pursuit” of learning which can be measured by class attendance, class participation (in class or online), taking required quizzes/examinations, and submission of work assignments or papers. Student engagement consists of a student attending at least 60% of the class sessions (there should be attendance throughout the term) and/or completing 75% of the assignments listed on the syllabus at the midpoint in the term. Exceptions can be made when there is on-going communication between the student and faculty member. The communication must be documented and the faculty member and student must be in agreement regarding the exception. Students not meeting the expectation will be administratively withdrawn from class. If a student believes he/she was administratively withdrawn in error, he/she may file an appeal. Being administratively withdrawn may have program and financial aid implications.
Academic Misconduct is any activity that tends to compromise the academic integrity of the college, or subvert the educational process. Examples of academic misconduct include, but are not limited to:

1. **Violation of course or program rules** as contained in the course syllabus or other information provided to the student; violation of program requirements as established by departments and made available to students.

2. **Plagiarism** including, but not limited to, submitting, without appropriate acknowledgment, any written, visual or oral material that has been copied in whole or in part from the work of others (whether such source is published or not) even if the material is completely paraphrased in one’s own words. This includes another individual’s academic composition, compilation, or other product, or a commercially prepared paper. Plagiarism also includes submitting work in which portions were substantially produced by someone acting as a tutor or editor.

   Such practices constitute plagiarism regardless of motive. Those who deny deceitful intent, claim not to have known that the act constituted plagiarism, or maintain that what they did was inadvertent are nevertheless subject to penalties when plagiarism has been confirmed.

3. **Cheating** and dishonest practices in connection with examinations, papers and projects, including but not limited to using unauthorized notes, study aids or information on an examination; taking an exam or doing work for another student; providing one’s own work for another student to copy and submit as his/her own; or allowing another student to do one’s work and then submitting the work as one’s own. Also included would be altering a graded work after it has been returned, then submitting the work for re-grading; or submitting identical or similar papers for credit in more than one course without prior permission from the course instructors.

4. **Fabrication** including but not limited to falsifying or inventing any information, data or citation; presenting data that were not gathered in accordance with defined appropriate guidelines, and failing to include an accurate account of the method by which data were collected.

5. **Obtaining an Unfair Advantage** including, but not limited to stealing, reproducing, circulating, or otherwise gaining access to examination materials prior to the time authorized by the instructor; unauthorized collaborating on an academic assignment; taking, hiding or altering resource material; or undertaking any activity with the purpose of creating or obtaining an unfair advantage over another student’s academic work.

6. **Aiding and Abetting Academic Dishonesty** including, but not limited to providing material, information or other assistance to another person with the knowledge that such aid could be used in any of the violations stated above, or providing false information in connection with any inquiry regarding academic integrity.

7. **Alteration of Grades or Marks** including but not limited to, action by the student in an effort to change the earned credit or grade.

In addition, cases of academic dishonesty may involve photocopied materials. Materials used may fall under the Copyright Act. Violations of said Act may subject the user and/or the College to sanctions.

**Statement on Disabilities:** Any student who requires reasonable accommodations related to a disability should inform the course instructor and the Coordinator of Specialized Services (Room 138 in Kee Hall; phone 419-755-4727).

Students who encounter difficulty in any of their courses are encouraged to visit the Tutoring Resource Center (Room 119 in Fallerius Technical Education Center) for tutoring assistance, and the Student Success Center (Room 136 in Kee Hall) for academic assistance, advising services, referrals for personal counseling and Learning Disability (LD) Testing.
**Statement on Withdrawals**: As a student, you are expected to attend class. If you are unable or choose not to attend class, or if for whatever reason you are unable to keep up with the requirements of a course, you need to officially drop the class at the Student Records Office. Refund dates and withdrawal dates will vary slightly from term to term. Contact the Student Records Office for applicable dates. Additionally these dates are posted on the academic calendar available on the college’s website, [www.ncstatecollege.edu](http://www.ncstatecollege.edu), under the Academics heading on the home page and are available at the Student Records Office in Kee Hall. Students should go to the Student Records Office (Room 142 in Kee Hall) to process their withdrawal from any class.

If you choose to walk away from your class without officially withdrawing from it, the faculty member teaching the class must grade your classroom performance on the material available to him or her. This normally results in an "F" grade. An "F" grade can lower your grade point average considerably depending on the total credits accumulated.