A. **Academic Division:** Business, Industry and Technology

B. **Discipline:** Manufacturing

C. **Course Number and Title:** MFGT2010 Jig and Fixture Design

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 hours  
   Laboratory: 2 hours

F. **Prerequisites:** MFGT1110 and either MECT1150 or ENRD2260

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

H. **Textbook(s) Title:**
   - *Jig and Fixture Design*  
     - Author(s): Edward G Hoffman  
     - Copyright year: 2003  
     - Edition: 5th  
     - ISBN #: 1401811078

I. **Workbook(s) and/or Lab Manual:** *E-Book* provided by Instructor: Compilation of Tool Design Instructions and Projects

J. **Course Description:** Tool design is the process of designing and developing the tools, methods, and techniques necessary to improve manufacturing efficiency and productivity. Students use Solid Modeling software to design tools used in fabricating, welding, and inspection applications. Tool design is an ever-changing, growing process of creative problem solving which addresses quality and economy to produce a competitive product to solve manufacturing situations.

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>
<td></td>
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<tr>
<td>Communication – Speech</td>
<td></td>
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<tr>
<td>Intercultural Knowledge and Competence</td>
<td></td>
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</tbody>
</table>
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. Identify job skills needed to become a Tool Designer.</td>
<td>Week one Written assignments and exam</td>
</tr>
<tr>
<td>2. Identify basic types and functions of jigs and fixtures.</td>
<td>Starting week two Worksheets, case studies design projects</td>
</tr>
<tr>
<td>3. Identify considerations of design economics and apply to final exam project.</td>
<td>Fourth week to end of semester Worksheets, case studies design projects Industry standard financial application</td>
</tr>
<tr>
<td>4. Design basic jigs and fixtures, applying proper principles of safety, practicality and sound construction.</td>
<td>Fifth week to end of semester Worksheets, case studies design projects Final project/exam</td>
</tr>
<tr>
<td>5. Identify and describe specialized work holding devices and their benefits and applications.</td>
<td>Week two to end of semester Worksheets, case studies design projects Final project/exam</td>
</tr>
<tr>
<td>6. Identify and specify acceptable tool materials, application and components in design projects.</td>
<td>Week four through end of semester Worksheets, case studies design projects Final project/exam</td>
</tr>
<tr>
<td>7. Use solid modeling software such as AutoDesk Inventor as a tool to design and troubleshoot special tooling used in manufacturing situations.</td>
<td>Week four through end of semester Worksheets, case studies design projects Final project/exam</td>
</tr>
<tr>
<td>8. Use CAD and solid modeling software to create technical drawings of special tooling in compliance with ANSI standards.</td>
<td>Week four through end of semester Design projects Final project/exam</td>
</tr>
<tr>
<td>9. Use Plotter to produce prints to ANSI standards.</td>
<td>Week four through end of semester Design projects Final project/exam</td>
</tr>
<tr>
<td>10. Participate in CONCURRENT ENGINEERING activities.</td>
<td>Week four through end of semester Technical communications, guided case studies, design projects Final project/exam</td>
</tr>
<tr>
<td>11. Evaluate proposed solutions to manufacturing problems by completing peer evaluations of technical drawings.</td>
<td>Week nine to end of semester Peer evaluations</td>
</tr>
<tr>
<td>12. Create tooling to provide a solution to an automated manufacturing case such as CNC machining centers, inspection, or assembly scenarios.</td>
<td>Week four through end of semester Design projects, concurrent engineering activities, Final project/exam</td>
</tr>
</tbody>
</table>

M. Topical Timeline (Subject to Change):

1. Purpose of Tool Design
   a. First week of semester.
   b. Examine various job postings and compile a job description for Tool Designer.
   c. Introduced week three of semester.
   d. Participate in problem solving tool design team activities.
2. Types of Functions of Jigs and Fixtures
   a. Second week and throughout semester.
   b. Complete assigned worksheets, case studies and tool design projects as assigned.
3. Supporting and Locating Principles  
   a. Introduced fourth week of semester.  
   b. Calculate cost effectiveness of incorporating special tooling in a variety of manufacturing settings.

4. Clamping and Work holding Principles  
   a. Introduced fifth week of semester.  
   b. Complete lab assignments to problem-solve manufacturing situations by using 3D solid modeling software to create and troubleshoot specified processes.

5. Basic Construction Principles applied to developing a design  
   a. Introduced fifth week of semester.  
   b. Identify problems in case study assignments and design tooling, using 3D solid modeling software to create and troubleshoot.

6. Tool Drawings  
   a. Introduced sixth week of semester.  
   b. Use 3D solid modeling software to create and troubleshoot through properties and component libraries.

7. Communication and Concurrent Engineering Applications  
   a. Introduced week three of semester.  
   b. Participate in problem solving tool design team activities.

8. Use of Tool Libraries and Web Downloads  
   a. Introduced fifth week of semester.  
   b. Download SAT files and Library components into solid models of designs.  
   c. Starting fourteenth week of semester.  
   d. Evaluate all types of tooling presented to date and create a tool to solve a specific manufacturing scenario as a Final Project.

9. Designing Template Jigs  
   a. Starting fifth week of semester and for each lab drawing design assignment.

10. Design Economics  
    a. Fourth week  
    b. Calculate efficiency and cost effectiveness of special tools  
    c. Ergonomic Considerations

11. Design fixtures for Welding, Inspection, NC Machine Tools, Modified vise jaw  
    a. Starting seventh week of semester.  
    b. Create and produce technical prints on size ANSI A through F paper from various paper types on the plotter.

12. Participate in peer evaluations  
    a. Introduced ninth week of the semester.  
    b. Students will critique the work of others and give written feedback and suggestions.

N. Course Assignments:

1. Students will identify type of tooling needed to accomplish manufacturing problem solving.  
2. Students will develop tooling plan to accomplish manufacturing problem solving.  
3. Complete written homework assignments and scheduled tests.  
4. Participate in Concurrent Engineering activities with the use of software such as Illuminate, Oracle or Windows Live.  
5. Students will complete manufacturing documents to industry standards.  
6. Students will develop detailed technical prints to industry standards.
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 though 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; obtaining help from another student during 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, 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.