**Course Syllabus**

**Course:** ENGT 151 – Cutting & Workholding

**Section #:** 01

**Semester:** Spring 2013

**Course Credits:** 1Lecture, 2 Lab, 2 Credit Hours

**Developer:** John Daum 217-875-7211 X447

**Dev/Rev Date:** Spring 05

**PCS #: IAI #:** (if applicable)

**Class Data:**

Section: 01

Time: 9:00-11:50 T ,Th

Room: E152

This section begins on Mar 18 and ends on May 16.

**Instructor Information:**

Name: John Daum

Phone: 217-875-7211 ext 447

Office: E152A

Email: [jdaum@richland.edu](mailto:jdaum@richland.edu)

**Office Hours**:

Mon, Wed : 11 to 12:30 ; 2:15 to 2:45 Tues, Thur: 12 to 12:30

And By Appointment

**Course Description:**

ENGT 151 - Cutting & Workholding introduces the theory and operation of metal cutting tools used manual and CNC machining. Tools covered include drills and reamers, end mills, mill cutters, tool bits, single-point turning tools, indexable tooling, and thread tap and dies. Topics also include tool selection, machinability of different materials, calculation of speeds and feeds, and spindle horsepower requirements. Elementary heat treatment of metals and case hardening are covered as to how they effect tool selection. Work holding topics include the operation, selection and proper use of chucks, vises, clamps, and custom fixturing. Students will also perform simple operations such as basic grinding, face, turn, bore, knurl, chamfer, center drill, tap, groove, cut tapers, adjust feeds and speeds, mill flat, square surfaces, and make slots. Offered in Spring.

This course has been modified in content and delivery to meet the critical objectives for the INAM grant program.

Applicable toward graduation where program structure permits:

Certificate or Degree - All Certificates and Degrees

Group Requirement – Not Applicable

Area of Concentration – Manufacturing Technology/Machining

**Course Prerequisite:**

No Prerequisite is required. However, due to the subjects covered, it is assumed that the student is competent in high school level reading, math, and basic computer user concepts.

**Course Objectives/Outcomes:** The student will be able to perform or demonstrate the following skills at the end of the course.

|  |
| --- |
| **Course Outcomes:** |
| 1. Demonstrate knowledge of basic OSHA requirements, general shop safety, and machine tool safety procedu |
| 1. Select the proper cutting tool, feed and speed, and work holder to machine a part to specifications |
| 1. Apply a working knowledge of basic measuring and inspection tools and use appropriate measuring devises to confirm a part’s compliance to required specifications including GD&T symbols |
| 1. Determine insert geometry, nose radius, thickness, shape & grades |
| 1. Apply chip cutting theory to machining applications |
| 1. Preform conversion, computations, and calculations that result in parts production to specific industry standards and specifications |
| 1. Inspect tooling condition and replace perishable tooling when dull |
| 1. Setup a part and clamp in fixture |
| 1. Determine cutting feeds and speeds |
| 1. Select proper cutoff and saw blades |
| 1. Select proper cutting tools based upon type of material |
| 1. Select cutting tools and accessories for hole production |
| 1. Select cutting tools and accessories for milling |
| 1. Select cutting tools and accessories for turning |
| 1. Demonstrate use of basic math skills to facilitate technical metal cutting competences. |
| 1. Select coolants and cutting fluids |
|  |
| **RCC Cross-Disciplinary Outcomes:** |
| 1. The degree-seeking student will be able to communicate effectively (read, write, speak and listen). |
| 1. The degree-seeking student will think critically and creatively |
| 1. The degree-seeking student will manage technology and evaluate information in various research and applied contexts. |
| 1. The degree-seeking student will act professionally and responsibly |

**Text:**

*Machining and CNC Technology*, 2nd Edition, Author: Michael Fitzpatrick,

McGraw-Hill, 2011 ISBN-13 9780077388072

**Topical Outline:**

|  |  |
| --- | --- |
| Week 1 | Introductions, lab procedures, rules, safety, Technical Math, Calculators, |
| Week | Chip Cutting Theory, band saw blades, Coolants and Cutting Fluids |
| Week 2 | Feeds and Speed Calculations |
| Week | Drills, Taps, |
| Week 3 | Turning Tools Drilling, Boring bars |
| Week | Chucks, Tailstocks, Steady Rest, Dogs |
| Week 4 | Indexable Inserts |
| Week | Mill Tooling |
| Week 5 | Vises and Hold down clamps |
| Week | Indicating in the vice, Alignment and centering |
| Week 6 | Edge and hole finding |
| Week | Tool Inspection and Grinding |
| Week 7 | Projects |
| Week | Projects |
| Week 8 | Final |

**Methods of Delivery:**

This course utilizes competency based learning which requires the student to perform tasks designed to demonstrate the ability to meet course requirements. The course incorporates lecture, discussion, group activities, individual activities, assigned reading, problem solving, critical thinking, and structured competency-based laboratory experiences.

**Grading Policy:**

Grades will be compiled from the following weighted scale:

Grades will be compiled from the following weighted scale:

Labs and projects 50%

Saw, Drill, and Grind 10

Turn 20

Mill 20

Homework 10%

Tests 30%

Class Participation, attendance and SCAN skills 10%

Late work will be marked down one letter grade.

Grades will be determined by a composite score of unit exams, comprehensive final examination, group activities, written projects, and student project assignments. Please note that speed and efficiency will be an attribute measured during testing. Homework is mandatory and will be graded. Late work will be marked down one letter grade and will not be accepted after the next class period. **This includes unapproved absences on test days!!**

**Methods of Evaluation:**

This course incorporates discussion, problem solving, reading and writing, student questions, cooperative group activities, and lectures. Students are strongly encouraged to come to class prepared to ask questions and participate in the learning process in the classroom

Letter grades and lab scores will be based upon the following attributes listed below:

Accuracy, speed, overall quality, attention to detail, conformance to requirements, teamwork, dependability, proper use and care of tools and equipment, clean-up of equipment, troubleshooting and minimizing mistakes, following instructions, ability to perform increasingly higher level tasks.

Grading criteria of lab work is detailed as follows:

" **A** "Always executes skills without supervision, can explain and show others. Exceeds all requirements and expectations, with no rework, in an efficient, timely manner. Able to solve most problems independently and takes on higher level tasks. Helps others.

" **B** " Frequently executes skills without supervision. Meets all requirements, with limited rework, working at a reasonable pace. Able to solve most problems with limited input from others. Does not need help. Can take on some higher level tasks.

" **C** " Usually executes skills without supervision. Meets all requirements, with occasional rework, using maximum time allotted. Not able to solve problems without limited help from others. Not ready for higher level tasks.

" **D** " Infrequently executes skills without supervision. Inconsistent in ability to perform required tasks. Is in constant need of help. Normally needs others to help complete work. Can not solve problems without significant help from others. Can not complete tasks in a timely manner. Unable to do more than the minimum.

" **F** " Did not perform the required work. Unacceptable attendance and class participation. Unable to execute skills without supervision. Use help from others to complete work. Can not solve troubleshooting problems. Does not complete tasks in a timely manner.

**Important Course Content Information:**

**Field Trip:**

A field trip will be utilized to study real world examples. A report will be due one week after the visit. The topic will be assigned after the visit. The report should be a minimum of two typed pages of concise discussion, applying material studied to actual observations. The paper must be typed using word processor software, double-spaced, with 12 pt font. Due to scheduling conflicts, field trips and lab time cannot be made up. Since field trips cannot be made up, missing a field trip will drop your final grade by one letter!

**Supplies:**

**The following tools are required everyday in class:**

1. Scientific calculator with trigonometric functions (Cell phones may not be used)
2. Safety Glasses (protected in a sock)
3. Pocket sized notepad
4. Steel rule 6”
5. Dial Caliper 0-6
6. Micrometer 0-1
7. Shop coat (optional

The following additional supply items are required:

1. USB Flash Drive (2 GB)
2. Ruler with metric (millimeters)
3. 3-ring notebook
4. Red ink pen
5. Graph paper
6. Loose leaf lined paper
7. Highlighter

**Attendance:**

*Regular attendance is necessary for satisfactory completion of a course. Richland faculty will take roll at each class meeting at least through midterm. If a student is absent for one week plus one day (or less, if specified by the instructor in the course outline), his/her name may be sent to the Registrar’s Office. Students with unsatisfactory attendance will be sent a “stopped attending” letter. At midterm the College will administratively drop any student who has failed to meet the attendance standard as certified by the instructor. This report will be used to determine certain financial aid awards. A student who fails to attend the first two classes of a course may also be dropped from the class.*

Each unexcused missed class will result in a 2% deduction in the attendance grade. Five or more unexcused absences may result in an administrative drop. **Student must notify instructor prior to class for approval of absence**. No tests/quizzes may be made up without prior approval. **Students wishing to drop class must complete written drop request form, which includes instructor’s signature, or a grade of “F” will result.**

**Instructor Absence:**

In the unlikely event that the instructor is unable to attend class, a note will be posted in the classroom by the department assistant stating such. In case of instructor delay, students should practice good time management skills by working on course material until the instructor arrives. In no case will the class be cancelled without an official notice from the department assistant. The instructor will make every attempt to contact students ahead of time if class is cancelled due to illness. It is the student’s responsibility to keep their registration contact phone number up to date.

**Safety Warning:**

**LAB EQUIPMENT UTILIZES HIGH PRESSURE COMPONENTS, HIGH VOLTAGE POWER SOURCES, ROTATING SHAFTS, AND FLYING CHIPS. WEAR SAFETY GLASSES WHEN OPERATING ANY LAB EQUIPMENT. FAMILIARIZE YOURSELF WITH ALL OPERATING INSTRUCTIONS AND SAFETY REQUIREMENTS PRIOR TO OPERATING EQUIPMENT!!!!!ASK FOR ASSISTANCE IF YOU ARE UNCERTAIN ABOUT THE OPERATION OF ANY MACHINE OR PROCESS. BE AWARE OF OTHER STUDENT’S ACTIVITIES!!**

**Student Responsibility for Insurance:**

The College provides no medical, long-term disability or life insurance for students, and as such, the student assume full responsibility for any medical or loss of time expenses. , if any should occur during the period of this event, including but not limited to classroom, field trips, and travel outside of the classroom.

**National/ State/ Local Skill Standards:**

* Illinois Skill standards for Manufacturing are not published at this time.
* Illinois Skill standards for Machining are incorporated when applicable.
* NIMS - National Institute for Metalworking Skills are incorporated when applicable

**Classroom Procedures:**

Students will conform to the RCC Student Conduct policies included in the College Course Catalog. Violations of these rules will result in a reduction of your class participation grade and possible removal from class:

* Students will follow the posted Safety and Shop Procedures.
* Students are expected to be prepared and ready to perform at the best of their abilities.
* Students are expected to be on time!
* Cell phones and pagers must be turned off before entering the class room.
* Food and beverages are not allowed in the classroom.
* The student is to be courteous to others and respect their right to have an opportunity to learn.
* The student will conduct him/herself in a professional manner at all times.
* The classroom will be run as a simulation of the workplace. The student is expected to exceed all workplace expectations.
* A student suspected of being under the influence of alcohol or illegal drugs will be asked to leave the classroom.

**ADDITIONAL HELP:**

Study Time Required:

Two hours or more of outside study for each class hour of lecture/discussion is usually needed for satisfactory performance, although this amount may vary from student to student. Two-hour laboratories giving one credit hour usually demand an hour of outside work to complete assignments. Students who plan to work at outside jobs while attending Richland should take study time into consideration when planning their schedules. **Time management skills** are important to succeed in this class. Instruction on these and other student study skills are available in the Student Success Center.

**Ten Ways to Successfully Study Engineering Technology:**

1. Read the required material before the instructor lectures.
2. Try to answer the assigned questions and problems at the end of the chapters on your own, and then check your responses with the solutions manual. Check your solutions soon after you complete the homework, and make a note of anything you don’t understand. Bring your questions to class.
3. Make a note of a couple of your classmates’ phone numbers and email addresses and contact fellow students if you are having difficulty.
4. Prepare for exams over a long period of time. “Coast and Cram” does not work well for exams. Practice is required to master the problems and practice takes time.
5. Ask questions and actively participate in class.
6. Visit your instructor and ask for help.
7. Get a tutor in the study assistance center.
8. Do not get behind on your homework.
9. Keep a positive attitude
10. DO YOUR HOMEWORK!!!!

BE SURE TO GET HELP BEFORE IT IS TOO LATE!

Office hours will be announced. The student is encouraged to get additional help when the material is not comprehended. Engineering Technology is a cumulative subject; therefore, getting behind is a difficult situation for the student.

**STUDY GROUPS**

The student is encouraged to study with other students. A study group of 2 to 4 persons is an excellent opportunity to ASSIST in the learning of technology. Each student in the study group should be responsible for the understanding of all of the material.

**Online Resources Available:**  Additional study resources are available on World Wide Websites: I encourage you to explore the many internet resources as a source of study assistance.

**Human Relations Policy:**

* This course incorporates concepts regarding all races, creeds, sexes, and ethnic groupings, and the belief that they must learn to live together.

**RCC Core Values:** The following core values will guide the class:

* Commitment - We are dedicated to meeting the needs of the communities we serve.
* Respect - We recognize the expertise of all members of the College community and encourage individual contributions.
* Excellence - We strive to develop and pursue higher standards.
* Accountability - We assume and demonstrate responsibility for our actions.
* Diversity/Inclusiveness - We believe that our similarities and differences are opportunities for establishing a common bond and strengthening the College.

**RCC Academic Integrity Policy:**

Each student is expected to be honest in his/her class work or in the submission of information to the College. The College regards dishonesty in classroom and laboratories and on assignments and examinations and the submission of false and misleading information to the College as a serious offense. A student who cheats, plagiarizes, or furnishes false, misleading information to the College is subject to disciplinary action up to and including failure of a class or suspension/expulsion from the College.

**Cross-Disciplinary Outcomes**

1. The degree-seeking student will be able to communicate effectively (read, write, speak and listen).
2. The degree-seeking student will think critically and creatively.
3. The degree-seeking student will manage technology and evaluate information in various research and applied contexts.
4. The degree-seeking student will act professionally and responsibly.

**Core Abilities/SCANS:**

1. Reading
2. Mathematics
3. Teamwork

Participate as a team member – contribute to group effort

1. Responsibility
2. Problem Solving
3. Information

Acquire and evaluate information

Organize and maintain information

Interpret and communicate information

**my.richland.edu**

Richland uses my.richland.edu as the information portal for students. Users can access a wide variety of web-based services, including online registration, academic information, Richland e-mail, the Angel Learning Management System, and the LRC research databases. Academic information available includes current semester schedule, unofficial transcripts, grade point average projection, financial aid information review, online payment services, and degree auditing to determine degree completion progress. Student grades are posted only on the my.richland.edu website. Grades will not be mailed to students unless requested.

Students with a “hold” placed on their records due to a financial obligation to the College or other unmet requirement will be unable to view academic records.

**RCC Student Support Services**

**College Telephone Number: 217-875-7211**

**Academic Success Center**

**Accommodations,** Room C148, Ext. 379

Responsibilities: Services for students with documented disabilities, including advisement, counseling, adaptive equipment and materials, instructional aids, tutors, note takers, interpreters, and testing accommodations.

**Testing,** Room S116, Ext. 238

Responsibilities: Placement testing in English, mathematics, reading, health courses; make-up testing as arranged by instructor; testing for online courses.

**Tutoring,** Room S118, Ext. 419

Responsibilities: Tutoring on walk-in or appointment basis, study groups, computers.

**Enrollment Services**

**Advising and Registration**, Room C129, ext 267

Responsibilities: Advisement, registration, general student services

**Financial Aid and Veteran Affair’s,** Room N136, ext 274

Responsibilities: federal and state aid, veteran and entitlement benefits, scholarships

**Student Records**, Room C129, Ext. 257

Responsibilities: grades, transcripts, graduation.

**Learning Resources Center (Library)**, Room C152, Ext. 303

Responsibilities: Manages print and electronic resources for students, faculty, and the broader College community. Offers research assistance, information literacy sessions, course reserves, and individual and group study areas.

**Online Learning Support**, [ochelp@richland.edu](mailto:ochelp@richland.edu) Room W143, Ext. 376

Responsibilities: Assists students with navigation in an online course, access and navigation in the student information system, and technical questions regarding personal computer system requirements and troubleshooting. Assistance is also given to students in hybrid and technology enhanced courses. Staff provide technical support through e-mail, telephone, and walk-in service. The best way for students to contact the Online Help Desk is to use the Tech Request Support Form at <http://www.richland.edu/online/support> or e-mail at [ochelp@richland.edu](mailto:ochelp@richland.edu). The Request goes directly to the Help Desk e-mail as well, and this e-mail is checked regularly.

**Open Computer Labs**

Students may use computers in the Learning Resources Center and in the Academic Success Center.

**Perkins Program**: Room E185, Ext. 223

**Message from Leslie DeVore,** Carl Perkins Federal Grant Administrator:

*The Perkins program is a federally-funded program designed to assist students in helping them become academically successful. For a student to be eligible for the Perkins Program they must be enrolled in an occupational program.*

*If a student is enrolled in an occupational area, they are automatically enrolled in the Perkins Program. Students may call the Perkins Program Coordinator for more information 875-7211, Ext. 223 or stop by E185.*

*All students should apply for financial aid (forms can be obtained from Student Development and Services on the first floor). Funding for the Carl Perkins Program is based on the number of students requesting financial aid.*

**Student and Career Development**

**Career Services**, Room C129, Ext. 307, 205

Responsibilities: Career assessments, job placement information and transfer information and assistance

**Counseling Services**, Room C129, Ext. 252

Responsibilities: Academic advising, personal counseling.

**Transfer Center**, Room C129, Ext. 222

Responsibilities: Transfer information, college visits, and campus representatives on campus

**Veteran Services**, Room C129, Ext. 307, 205

Responsibilities: assist veterans with comprehensive college services

**Student Engagement**

**Student Success**, Room C131, Ext. 314

Responsibilities: Passport workshops, academic success strategies and workshops, Success.net, (assist with identifying academic need early), and work with probation and suspension students.

**Student Support Services/TRiO Program,** Room C143, Ext. 440.

Responsibilities: Program designed for first-generation college students, offering academic and personal support.

**College Calendar Spring 2013**

Jan. 14 M Classes Begin

Jan. 21 M Martin Luther King, Jr., Day Observance (College Closed)

Feb. 18 M Presidents Day (College Closed)

Feb. 26 T Professional Development Day (College Closed)

Mar. 8 F Midterm

Mar. 11-16 M-S Spring Break (No Classes)

Mar. 29-30 F-S Spring Holiday (College Closed)

May 10 F Last Day for Withdrawal with “W” for 16-Week Classes\*

May 13-16 M-Th Final Exams

May 17 F Graduation

Schedule subject to change:

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **Date** | **Topics** | **Homework/Tests:** |
| **1** | Mar 18 | Chip Cutting Theory, band saw blades, Coolants and Cutting Fluids |  |
| **2** | Mar 25 | Feeds and Speed Calculations Drills, Taps |  |
| **3** | Apr 1 | Turning Tools Drilling, Boring bars Chucks, Tailstocks, Steady Rest, Dogs |  |
| **4** | Apr 8 | Indexable Inserts Mill Tooling |  |
| **5** | Apr 15 | Vises and Hold down clamps Indicating in the vice, Alignment and centering |  |
| **6** | Apr 22 | Edge and hole finding Tool Inspection and Grinding |  |
| **7** | Apr 29 | Tool Sharpening |  |
| **8** | May 6 | Projects |  |
|  | Mar 13 | **Last Day to Drop Friday May10** |  |
|  | May 14 | Final Thur May 16 | Final Test |

INAM Grant

“This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timelines, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use, by an organization and/or personal use by an individual for  non-commercial purposes, is permissible. All other uses require the prior authorization of the copyright holder.”