**ENGT 160 – Metrology and Quality Control**

**Master Syllabus**

**Course:** ENGT 160 – Metrology and Quality Control **Course Credits:** 2-2-3

**Course Prerequisite:** Eligibility for Math 104 **ICCB Code: PCS # 1.2150702**

**Mode of Delivery**: Traditional or hybrid **IAI #:** N/A

**Developer:** John Daum 217-875-7211 X447 **Dev/Rev Date:** 04/17/13

**Projected Date of Initial Offering:** Fall 2013

**Course Description:**

ENGT 160 - Metrology and Quality Control provides a hands-on introduction to precision measurement and quality control. Topics include an introductory overview of Total Quality Management, Statistical Process Control, Six Sigma, blue print specifications, and measurement math. Measuring instruments focus on machining inspection and include micrometer and vernier tools, dial indication instruments, hole inspection, production gaging, gauge blocks, and layout tools. Advanced technologies are introduced including coordinate measuring machine (CMM) and vision inspection system. Measurement data is analyzed with basic statistical methods including control charts, and sampling plans. Data is analyzed to determine correction plans.

This course was modified to meet the requirements of the Manufacturing Skills Standards Council (MSSC) and prepares the student for the Module 2: Quality Practices & Measurement Exam for the Certified Production Technician (CPT) certification.

Applicable toward graduation where program structure permits:

* Certificate or Degree – All Certificates, AAS, ALS
* Group Requirement - Not Applicable
* Area of Concentration – Not Applicable

**Illinois Network for Advanced Manufacturing Grant**

A modification to this course was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was create 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 of 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.”

**Text(s):**

* The Quality Technician’s Handbook Author: Griffith ISBN 0-13-041679-7

Publisher: Prentice Hall Date: 2003

* High-Performance Manufacturing, by MSSC, Glencoe/MacGraw-Hill., 2006

ISBN 0-07-861487-2

Lab materials to be furnished by instructor.

**Course Objectives/Outcomes:** The student will obtain the following skills and attitudes by completion of this course:

|  |  |
| --- | --- |
| **Course Outcomes:** | **RCC Cross-Disciplinary Outcomes:** |
| Utilize effective, safety-enhancing workplace practices in multiple industries |  |
| Participate in periodic or statistically based internal quality audit activities | 3 |
| Check and document calibration of gauges and other data collection equipment | 4 |
| Demonstrate an understanding of quality practices and measurement | 2 |
| Inspect materials and product/process at all stages to ensure they meet specifications | 4 |
| Document the results of quality tests | 1 |
| Document product and process compliance with customer requirements | 1 |
| Recognize preventative maintenance indicators to ensure correct operations |  |
| Take corrective actions to restore or maintain quality | 4 |
| Record process outcomes and trends | 1 |
| Identify fundamentals of blueprint reading | 3 |
| Use common measurement systems and precision measurement tools | 3 |
| Describe advanced technology inspection methods | 1 |
| Prepared to take the MSSC Module 2: Quality Practices & Measurement Exam for the Certified Production Technician (CPT) certification. | 1, 2, 3 |

**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.*

**Topical Outline:**

|  |  |  |
| --- | --- | --- |
| WEEK | CONTENT | LABS |
| Week 1 | Total Quality Management Overview |  |
| Week 2 | Part Specification and Print Reading | Lab #1 |
| Week 3 | Measurement Math | Lab #2 |
| Week 4 | Statistical Process Control | Lab #3 |
| Week 5 | Micrometer Measurement Tools | Lab #4 |
| Week 6 | Dial Caliper Functionality | Lab #5 |
| Week 7 | Vernier Measurement Tools | Lab #6 |
| Week 8 | Depth Measurement Tools (Midterm) | Lab #7 |
| Week 9 | Gauge Measurement Tools | Lab #8 |
| Week 10 | Surface Finish Inspection | Lab #9 |
| Week 11 | Inspection Surface Plate setups | Lab #10 |
| Week 12 | Geometric Tolerance | Lab #11 |
| Week 13 | Layouts | Lab #12 |
| Week 14 | Charting and data analysis | Lab #13 |
| Week 15 | CMM and Vision Inspection Systems | Lab #14 |
| Week 16 | Plant Tour |  |
| Week 17 | FINALS |  |

**Methods of Evaluation:**

**Grading:** Labs and projects 30% A = 90 - 100

Tests and quizzes 30% B = 80 - 89

Final 20% C = 70 – 79

Presentations and reports 10% F = 69 or below

Class participation and teamwork 10%

**Additional Course Information:** The following tools are required:

Calculator

USB flash drive

Safety Glasses

**Attendance Policy:**

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), the student may be dropped from the course. 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.

**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:**

* 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.

**Safety & Labs/Clinicals**

**Safety Warning:**

LAB EQUIPMENT UTILIZES HIGH PRESSURE COMPONENTS, HIGH VOLTAGE POWER SOURCES, ROTATING SHAFTS, AND FLYING CHIPS. **ALWAYS** 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:**

* Manufacturing Skill Standards Council Certified Production Technician (CPT) is incorporated when applicable.
* Illinois Skill standards for Machining are incorporated when applicable.
* NIMS - National Institute for Metalworking Skills are incorporated when applicable.

**Core Abilities/SCANS:**

Upon completion of the course, student will be able to demonstrate understanding of and proficiency in applying the following scans competencies:

1. **Resources: Identifies, organizes, plans, and allocates resources**

* Follow a schedule to complete assigned tasks on time.
* Provide a self-evaluation of performance based on the time and quality of work.

2. **Interpersonal: Works with others**

* Complete assigned responsibilities within the shop floor serving as a member of the team.
* Provide individual assistance/direction to peers as requested.
* Work well with all members of the class.

3. **Information: Acquires and uses information**

* Read and interpret maintenance instructions and procedures.
* Organize and practically apply theories of component operation.

4. **Systems: Understands complex inter‑relationships**

* Demonstrate knowledge of the following systems:

a. laboratory organization structure: physical and social

b. organization of personnel and facilities on the shop floor

c. systematic organization of training materials

* Monitors and corrects performance during:

a. the troubleshooting process

b. adjustments of individual laboratory work schedule

c. constantly evaluating the quality of work to achieve acceptable standards

d. Maintains record of performance and sets individual goals

5. **Technology**: Works with a variety of technologies, chooses procedure, tools and equipment required to perform the required task to the acceptable standards.

**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 Canvas 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**:

**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.

**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.”