COURSE IDENTIFICATION

Course Code/Number: MATH 114

Course Title: Industrial Math

Division: [x] Applied Science (AS)   [ ] Liberal Arts (LA)   [ ] Workforce Development (WD)

[ ] Health Care (HC)   [ ] Lifetime Learning (LL)   [ ] Nursing   [ ] Developmental

Credit Hour(s):   Three (3)

Effective Date: Fall 2013

Assessment Goal Per Outcome: 70%

COURSE DESCRIPTION

Beginning with concepts as basic as the difference between numbers and numerals, this course reviews mathematics principles and operations through trigonometry. The emphasis is on understanding mathematical principles rather than on rote memorization of techniques. Students will be introduced to the three kinds of calculator logic systems, how to identify which kind of logic any calculator uses, and how to enter problems to ensure that the answer is correct. This course also teaches direct measurements and calculated measurements (e.g., area, torque, speed, and flow rate). The course describes the basic kinds of metric measurement, the use of prefixes (kilo, centi, milli, etc.), and how and when to convert between metric and English measurement.

MINIMUM REQUIREMENTS/PREREQUISITES AND/OR COREQUISITES

None

TEXTS

The official list of textbooks and materials for this course is found on *my*Neosho.

http://www.neosho.edu/ProspectiveStudents/Registration/CourseSyllabi.aspx

GENERAL EDUCATION OUTCOMES

1. Practice Responsible Citizenship through:
   - identifying rights and responsibilities of citizenship,
   - identifying how human values and perceptions affect and are affected by social diversity,
   - identifying and interpreting artistic expression.
2. Live a healthy lifestyle (physical, intellectual, social) through:
   - listing factors associated with a healthy lifestyle and lifetime fitness,
   - identifying the importance of lifetime learning,
   - demonstrating self-discipline, respect for others, and the ability to work collaboratively as a team.
3. Communicate effectively through:
   - developing effective written communication skills,
   - developing effective oral communication and listening skills.
4. Think analytically through:
   - utilizing quantitative information in problem solving,
   - utilizing the principles of systematic inquiry,
   - utilizing various information resources including technology for research and data collection.

COURSE OUTCOMES/COMPETENCIES (as Required)

The student will be able to demonstrate the ability to:

1. Perform job-related calculations as required in an industrial work environment.
   A. Accurately work with whole numbers.
      1. Describe the difference between a number and a numeral.
      2. Demonstrate how to add three four-digit numbers, with carrying.
      3. Demonstrate how to subtract two four-digit numbers, with borrowing.
      4. Demonstrate how to multiply a four-digit number by a two-digit number.
      5. Demonstrate how to divide a four-digit number by a two-digit number.
   B. Accurately work with common fractions.
      1. State the definition of a fraction.
      2. Demonstrate how to reduce a fraction to its lowest terms.
      3. Demonstrate how to find the lowest common denominator of two fractions.
      4. Demonstrate how to add three common fractions having different denominators.
   C. Accurately work with decimal fractions.
      1. Describe the difference between a decimal fraction and a common fraction.
      2. Demonstrate how to round off a decimal fraction to a specified number of places.
      3. Demonstrate how to multiply one decimal fraction by another.
      4. Demonstrate how to round off the products and quotients of decimal fractions.
      5. Demonstrate how to change fractions from common form to decimal form, and vice-versa.
   D. Accurately work with ratios and proportions.
      1. Demonstrate how to calculate the ratio of two numbers.
      2. Demonstrate how to use a ratio to express a change.
      3. Demonstrate how to use a ratio to solve a typical plant problem.

E. Accurately work with powers and roots.
   1. Demonstrate how to calculate the value of a number given in exponential form.
   2. Demonstrate how to write products and quotients of numbers given in exponential form.
   3. Demonstrate how to calculate the value of a number raised to a fractional power.
   4. Demonstrate how to calculate the value of a number raised to a negative power.
F. Accurately work with calculators.
   1. Explain the importance of an algorithm in a calculator.
   2. Describe how a calculator with arithmetic logic performs calculations.
   3. Describe how a calculator with algebraic logic performs calculations.
   4. Describe how a calculator with RPN logic differs from other calculators.
G. Demonstrate a basic understanding of geometry.
   1. Explain the differences among a line, a line segment, and a ray.
   2. Identify a radius, a chord, and a diameter of a circle.
   3. Demonstrate how to measure an angle with a protractor.
   4. Define a circle.
   5. Identify a right triangle, an equilateral triangle, and an isosceles triangle in a drawing.
   6. Demonstrate how to duplicate an angle using a straightedge and a compass.
H. Demonstrate a basic understanding of algebra.
   1. Demonstrate how to calculate the value of an expression by performing mixed operations in the correct order.
   2. Demonstrate how to write an algebraic equation, based on a relationship stated in words.
   3. Demonstrate how to solve an algebraic equation for a specific variable.
I. Demonstrate the use of formulas.
   1. Identify values as length, area, or volume, based on their units of measurement.
   2. Demonstrate how to calculate the surface area and volume of a rectangle, a circle, a cylinder, and a sphere, given the dimensions of each and a list of formulas from which to choose.
   3. Demonstrate how to calculate the length of one side of a right triangle, given the other two sides.
J. Demonstrate a basic understanding of trigonometry.
   1. State the definition of the sine, cosine, and tangent of an angle.
   2. Demonstrate how to find the value of the sine, cosine, and tangent of a given angle, using either a trig table or a calculator.
   3. Demonstrate how to find the inverse sine, inverse cosine, and inverse tangent of a given value, using either a trig table or a calculator. o Demonstrate how to solve a geometric problem, using trigonometry.

2. Perform job-related measurements and conversions as required in an industrial work environment.
   A. Demonstrate an understanding of units of measurement.
      1. Identify various units of measurement.
      2. State the definition of the joule, the coulomb, and the horsepower
      3. Explain how to calculate pressure.
      4. Explain the difference between mass and weight.
      5. Demonstrate how to measure the volume of an object.
      6. Explain the difference between the Celsius scale and the Fahrenheit scale.

B. Demonstrate an understanding of metric measurement.
    1. List the seven base units in the SI (metric) system.
    2. Name three derived units.
    3. Define work and power in SI units.
    4. Explain what power is and how it is measured.
    5. Name two metric measuring instruments and their U.S. Standard equivalents.
C. Demonstrate an understanding of linear measurement.
    1. List five units used for making linear measurements.
    2. Demonstrate how to use a micrometer.
    3. Explain what each head of a combination square is used for.
    4. State the definition of parallax error.
    5. Define the different types of tolerance.
D. Demonstrate an understanding of surface measurement.
    1. Explain the difference between a continuous dial and a balanced dial on a dial indicator.
    2. State the definition of pitch on a screw.
    3. Name two hardness tests.
    4. Explain why nondestructive testing is preferable to destructive testing on surface coatings.
E. Demonstrate an understanding of bulk measurement.
    1. Explain why weight-density and the angle of repose are important to workers who handle and store loose bulk material.
    2. Name the two types of conveyors and list three specific examples of each type.
    3. Name the three basic measurements of bulk materials.
    4. Demonstrate how to find the radius of a circle, given its area, and how to find the area of a circle, given its circumference.
    5. Demonstrate how to convert a typical order of lumber into board feet.
F. Demonstrate an understanding of motion measurement.
    1. Name the three measurements of motion.
    2. State the definition of speed.
    3. Explain the difference between average and instantaneous velocity.
    4. Demonstrate how to interpret a graph of motion.
    5. Explain of the velocity of an object is shown on a graph of motion.
G. Demonstrate an understanding of force measurement.
    1. Name both the metric and the U.S. Standard units of measurement for force, mass, and acceleration.
    2. State the definition of force.
    3. Demonstrate how to calculate torque.
    4. State an advantage of using a balance instead of a scale.
    5. Demonstrate how to draw a force diagram.
H. Demonstrate an understanding of temperature measurement.
    1. Explain the difference between heat and temperature.
    2. Name four different scales for measuring temperature.
    3. Explain the use of heat-sensitive pellets, crayons, and paints.
    4. Explain how Bourdon tubes work.
    5. Explain how a pyrometer works.
I. Demonstrate an understanding of fluid measurement.

1. State the definition of a fluid.
2. Describe how liquids differ from gases.
3. List the instruments used to measure the level of water.
4. Name two instruments that measure the flow of fluids, and explain how they work.

J.   Demonstrate an understanding of electrical measurement.
1. List the parts of an atom.
2. Define potential difference.
3. Identify a wattmeter.
4. Describe the difference between alternating current and direct current.
5. Describe the difference between an ohmmeter and an ammeter.

MINIMUM COURSE CONTENT

The following topics must be included in this course. Additional topics may also be included.

    I.   Mathematical concepts
    II. Measurement concepts

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

<u>INSTRUCTIONAL METHODS</u>

1. Lecture and discussion will be used in the presentation of concepts, information and assignment requirements.
2. Demonstrations of assignments will be presented with real-life, work-related examples.
3. Outside assignments will consist of reading and completion of worksheets.
5. Audio-visuals may supplement instruction.

<u>STUDENT REQUIREMENTS</u>

Concepts will be evaluated through the use of workbook, periodic tests, and practical application.

<u>GRADING SCALE</u>

Grades will be determined according to the following scale:

        A = 90% - 100%
        B = 80% - 89%
        C = 70% - 79%
        D = 60% - 69%
        F = 0 - 59%

ASSESSMENT OF STUDENT GAIN

The purpose of assessing student learning at Neosho County Community College is to ensure the educational purposes of the institution are met and appropriate changes are made in program development and classroom instruction to allow for student success. The instructor(s) of this course will determine the methods of assessment most appropriate and complete an assessment report at the end of the course.

Attendance Policy

1. NCCC values interactive learning which promotes student engagement in the learning process. To be actively engaged, the student must be present in the learning environment.

2. Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed one-eighth of the total course duration, (which equates to one hundred (100) minutes per credit hour in a face-to-face class) the instructor has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been dropped. A student may petition the chief academic officer for reinstatement by submitting a letter stating valid reasons for the absences within one week of the registrar's notification. If the student is reinstated into the class, the instructor and the registrar will be notified.   Please refer to the Student Handbook/Academic Policies for more information

3. Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

ACADEMIC INTEGRITY

NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

ELECTRONIC DEVICE POLICY

Student cell phones and other personal electronic devices not being used for class activities must not be accessed during class times unless the instructor chooses to waive this policy.

NOTE

Information and statements in this document are subject to change at the discretion of NCCC. Students will be notified of changes and where to find the most current approved documents.

ACCOMMODATIONS

If you are a student with a disability who may need accommodation(s), in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, please notify the Dean of Student Services in the Student Services Office, Sanders Hall, 620-432-0304, on the Chanute Campus, or the Dean for the Ottawa and Online Campuses, 785-248-2798, on the Ottawa Campus as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

NON-DISCRIMINATION POLICY

The following link provides information related to the non-discrimination policy of NCCC, including persons with disabilities. Students are urged to review this policy.

http://www.neosho.edu/Departments/NonDiscrimination.aspx

SEXUAL MISCONDUCT POLICY (TITLE IX)

At NCCC, it is the responsibility of an instructor to help create a safe learning environment in the classroom, including both physical and virtual classrooms.   All instructors are considered mandatory reporters at NCCC, therefore any information regarding sexual misconduct that is shared by a student in one-on-one meetings with the instructor must be reported to appropriate personnel at the College. Instructors will keep the information private to the greatest extent possible, but it is not confidential. Generally, climate surveys, classroom writing assignments or discussions, human subjects research, or events such as Take Back the Night events do not provide notice that must be reported to the Coordinator by employees, unless the reporting party clearly indicates that they wish a report to be made.

The following link provides information related to the sexual misconduct policy of NCCC, including resources, reporting options, and student rights. Students are urged to review this policy.

http://www.neosho.edu/TitleIX.aspx

COURSE NOTES