

T ED142 : Technical Measurements and Calculations

General Information

Author:	<ul style="list-style-type: none">Christopher Herwerth
Course Code (CB01) :	T ED142
Course Title (CB02) :	Technical Measurements and Calculations
Department:	Technical Education
Proposal Start:	Fall 2022
TOP Code (CB03) :	(0956.00) Manufacturing and Industrial Technology
CIP Code:	(15.0613) Manufacturing Engineering Technology/Technician.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000604051
Curriculum Committee Approval Date:	Pending
Board of Trustees Approval Date:	Pending
Last Cyclical Review Date:	09/01/2020
Course Description and Course Note:	T ED 142 covers a practical application of basic measurements and calculations to typical industrial problems and activities. Topics include units of measure and conversions, reading measurement tools and making calculations that are common technical career jobs. Project based hands- on activities in a variety of technical areas such as surveying, manufacturing, electronics, construction, engineering and environmental technology are emphasized. Students' understanding of mathematical concepts are reinforced through contextualized learning and applied technology based projects. Note: This course cannot be used to substitute for any college math requirements.
Justification:	New Course
Academic Career:	<ul style="list-style-type: none">Credit
Mode of Delivery:	No value
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none">Industrial Technology (Foundry occupations)
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade Only

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to CSU only

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	72
Total Student Learning Hours	162

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	2	4
Laboratory Hours	3	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	36

Laboratory	54
Studio	0
Total	90

Course Out-of-Class Hours

Lecture	72
Laboratory	0
Studio	0
Total	72

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Advisory

MATH90 - Intermediate Algebra for BSTEM

Objectives

- simplify expressions with rational exponents;
- solve rational equations;
- find the equation of a line parallel or perpendicular to a given line;
- solve applied problems;
- graph functions (linear, quadratic, exponential, logarithmic);

Entry Standards

Entry Standards	Description
No value	No value

Course Limitations

Cross Listed or Equivalent Course	Description
No value	No value

Specifications	
Methods of Instruction	
Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations
Methods of Instruction	Field Activites (Trips)
Methods of Instruction	Presentations
Out of Class Assignments calculations (e.g. calculate the density of an aluminum block); individual project (e.g. measure a room at home and calculate the floor plan area).	
Methods of Evaluation Exam/Quiz/Test Activity (answering journal prompt, group activity)	Rationale quizzes; verbal practicum (e.g. student explains the proper use of a wrench);

Project/Portfolio

projects (e.g. calculation of the flow rate of water through a pipe);

Exam/Quiz/Test

final exam.

Textbook Rationale

No Value

Textbooks

Author

Title

Publisher

Date

ISBN

Robert A. Carmen

Mathematics for the Trades: A
Guided Approach

Pearson

2019

9780134756967

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Calculate areas and volumes of various shapes;

use measurement tools such as rulers, calipers, and multimeters;

reference industry standards and vocabulary such as pipe schedules;

graph data from measurement experiments.

SLOs

Apply industry standards to calculate or analyze problems and choose appropriate solution processes

Expected Outcome Performance: 70.0

ILOs Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate
Core creativity that leads to innovative ideas.
ILOs

Characterize and compare systems of units and how they are used in various industries

Expected Outcome Performance: 70.0

ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
Core ILOs	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.

Course Content

Lecture Content

Introduction (3 hours)

- Introduction to technology
- Units of measure
- International System (SI) and American Standard Units
- Reading measurement tools

Piping and plumbing (3 hours)

- Calculating cross sectional area of pipes
- Arithmetic of piping networks
- Flow rates
- Pipe schedules and standards
- Piping materials, measuring mass and densities

Surveying (3 hours)

- Calculating elevations
- Distances, angles and areas
- Precision of instruments
- Terminology of surveying
- Error calculations

Construction (3 hours)

- Lumber supply calculations
- Measuring, adding and estimating materials
- Roofing and flooring estimates
- Building code calculations
- Measuring and cutting

Machining (3 hours)

- Standard sizes and tables
- Calculating taper angles
- End mill speed calculation
- Screw Threads
- Cutting Speed and Feed
- Calculating gear ratios and mechanical advantage
- Density of metals
- Inspection and statistical analysis in quality assurance

Industrial technology (2 hours)

- Manufacturing
- Calculating efficiency in manufacturing
- Welding calculations

Automotive trades (3 hours)

- Speed and acceleration
- Fluid calculations and volumes
- Calculating power, compression ratios and volume ratios
- Electric and hybrid car comparisons
- Electric car voltage, current and power calculations

Electrical and electronics (3 hours)

- Measuring voltage
- Calculation electrical power

- Electrical properties
- Units in electricity

Energy (3 hours)

- HVAC load calculations, humidity measurement
- Solar power installation calculations
- Calculating heat
- Temperature measurement

Agriculture (3 hours)

- Units in agriculture
- Calculation of crop yields
- Water measurement
- Environmental calculations
- Calculation of pesticide and fertilizer runoff

Aviation technology (3 hours)

- Wind speed measurement
- Fuel weight and density calculation
- Altitude and air temperature relationship
- Center of gravity of an aircraft
- Pitot tube, pressure measurement and velocity calculation

Environmental sustainability (4 hours)

- Reading pollution sensors
- Calculating pollution accumulations
- Environmental and societal issues in technology
- Cost benefit comparisons
- Water and wastewater treatment
- Recycling costs, life-cycle assessment

Total Lecture Hours 36

Laboratory/Studio Content

Introduction (3 hours)

- Introduction to technology
- Units of measure
- International System (SI) and American Standard Units
- Reading measurement tools

Piping and plumbing (5 hours)

- Calculating cross sectional area of pipes
- Arithmetic of piping networks
- Flow rates
- Pipe schedules and standards
- Piping materials, measuring mass and densities

Surveying (4 hours)

- Calculating elevations
- Distances, angles and areas
- Precision of instruments
- Terminology of surveying
- Error calculations

Construction (5 hours)

- Lumber supply calculations
- Measuring, adding and estimating materials
- Roofing and flooring estimates
- Building code calculations
- Measuring and cutting

Machining (5 hours)

- Standard sizes and tables
- Calculating taper angles
- End mill speed calculation
- Screw Threads

- Cutting Speed and Feed
- Calculating gear ratios and mechanical advantage
- Density of metals
- Inspection and statistical analysis in quality assurance

Industrial technology (4 hours)

- Manufacturing
- Calculating efficiency in manufacturing
- Welding calculations

Automotive trades (5 hours)

- Speed and acceleration
- Fluid calculations and volumes
- Calculating power, compression ratios and volume ratios
- Electric and hybrid car comparisons
- Electric car voltage, current and power calculations

Electrical and electronics (5 hours)

- Measuring voltage
- Calculation electrical power
- Electrical properties
- Units in electricity

Energy (5 hours)

- HVAC load calculations, humidity measurement
- Solar power installation calculations
- Calculating heat
- Temperature measurement

Agriculture (4 hours)

- Units in agriculture
- Calculation of crop yields
- Water measurement
- Environmental calculations
- Calculation of pesticide and fertilizer runoff

Aviation technology (4 hours)

- Wind speed measurement
- Fuel weight and density calculation
- Altitude and air temperature relationship
- Center of gravity of an aircraft
- Pitot tube, pressure measurement and velocity calculation

Environmental sustainability (5 hours)

- Reading pollution sensors
- Calculating pollution accumulations
- Environmental and societal issues in technology
- Cost benefit comparisons
- Water and wastewater treatment
- Recycling costs, life-cycle assessment

Total Laboratory Hours 54