Course Outline

General Information

COURSE ID (CB01A AND CB01B)

DMT 95

COURSE TITLE (CB02)

Manufacturing Materials and Processes

COURSE CREDIT STATUS

Credit - Degree Applicable

EFFECTIVE TERM

Fall 2024

COURSE DESCRIPTION

The focus of this manufacturing course is the application of materials and process analysis and selection techniques. The role of metals, polymers, ceramics, and composites in the casting, molding, forging, forming, machining, joining, heat, and surface treatment processes is researched throughout the course.

FACULTY REQUIREMENTS

DISCIPLINE 1

Manufacturing Technology (Quality control, process control)

FSA

FHDA FSA - MACHINE TOOL TECH

COURSE FAMILY

Not Applicable

Course Justification

This is an employment preparation course for our Design and Manufacturing Technologies day and evening programs. This CTE, CSU transferable course is intended to better prepare students for work in the advanced manufacturing and machining industry in the area of material properties, machinability, and manufacturing processes as advised by our industry advisory committee. This course is also a part of the CNC/Research & Development Machinist degree.

Foothill Equivalency

DOES THE COURSE HAVE A FOOTHILL EQUIVALENT?

No

FOOTHILL COURSE ID

Formerly Statement

Course Development Options

BASIC SKILL STATUS (CB08)

Course is not a basic skills course.

GRADE OPTIONS

- Letter Grade
- Pass/No Pass

REPEAT LIMIT

0

Transferability & Gen. Ed. Options

Information below is subject to change. For the official listing of courses, their approval dates, and transfer credit limitations, check the De Anza catalog (by academic year), ASSIST.ORG (https://assist.org/) and C-ID.NET (https://c-id.net/).

TRANSFERABILITY

Transferable to CSU only

Units and Hours

Summary

MINIMUM CREDIT UNITS	4.0
MAXIMUM CREDIT UNITS	4.0

Weekly Student Hours

Type	In Class	Out of Class
Lecture Hours	3.0	6.0
Laboratory Hours	3.0	0.0

Course Student Hours

COURSE DURATION (WEEKS)

12.0

HOURS PER UNIT DIVISOR

36.0

Course In-Class (Contact) Hours

LECTURE

36.0

LABORATORY

36.0

TOTAL

72.0

Course Out-of-Class Hours

LECTURE

72.0

LABORATORY

0.0

NA

0.0

TOTAL

72.0

Prerequisite(s)

Corequisite(s)

Advisory(ies)

ESL 261 and ESL 265, or ESL 461 and ESL 465, or eligibility for EWRT 1A or EWRT 1AH or ESL 5

Limitation(s) on Enrollment

Entrance Skill(s)

General Course Statement(s)

Methods of Instruction

Lecture and visual aids
Discussion and problem solving performed in class Quiz and examination review performed in class Homework and extended projects Laboratory discussion sessions and quizzes that evaluate the proceedings weekly laboratory exercises

Assignments

A. Readings from metallurgy text, materials reference books and trade magazines.
B. Research and final report on selected material manufacturing topics.
C. Lab exercises to recognize various materials strength and hardness.

Methods of Evaluation

A. Completion and accuracy of lab assignments.
B. Written research report that demonstrates critical thinking regarding the material plan, as well as comprehension and application of manufacturing processes.
C. Midterm and comprehensive final exam to evaluate comprehension of terms and concepts, as well as application skills related to materials and manufacturing processes.

Essential Student Materials/Essential College Facilities

Essential Student Materials:

- None

Essential College Facilities:

- DMT materials lab

Examples of Primary Texts and References

Author	Title	Publisher	Date/Edition	ISBN
Daniel A. Brandt Daniel A.,Warner J.C.,	Metallurgy Fundamentals: Ferrous and Nonferrous Sixth Edition, Textbook	Goodheart-Willcox	2019 - Sixth Edition	978-1635638745

Examples of Supporting Texts and References

None.

Learning Outcomes and Objectives

Course Objectives

- Apply material property analysis to create and understand materials tables/graphs.
- Identify material and process properties and characteristics as selection criteria.
- Compare material properties and classifications to metals, polymers, ceramics and composites.
- Explain the types and characteristics of various casting processes.
- Describe the technology inherent in various molding processes.
- Differentiate between forming, forging, powdered metal and die casting.
- Describe various heat treatment processes.
- Discuss and explore non-traditional machining processes

CSLOs

- Conduct material property analysis to determine appropriate material selection and use.
- Analyze, compare, and explain manufacturing processes such as molding, forming, forging and casting.

Outline

A. Apply material property analysis to create and understand materials tables/graphs.
    1. Structure and composition of materials in the four basic groups.
    2. Modules of elasticity, stiffness, ductility, plasticity.
    3. Graphical analysis of mechanical properties/creating tables/graphs.
B. Identify material and process properties and characteristics as selection criteria.
    1. Phases, alloys, melting points, specific heat, density.
    2. Coefficients of thermal/electrical conductivity/expansion.
    3. Refractive index, coefficient of friction, corrosion resistance.
    4. Aware of material data sheets.
C. Compare material properties and classifications to metals, polymers, ceramics and composites.
    1. Mechanical and physical comparative properties.
    2. Classification systems, sources, types by processes.
    3. Applied laboratory testing and processes.
D. Explain the types and characteristics of various casting processes.
    1. Sand, shell and rubber/plaster mold casting.
    2. Lost wax and lost foam casting.
    3. Permanent mold, die and centrifugal casting.
E. Describe the technology inherent in various molding processes.

1. Polymer melts, extrusion.
2. Injection molding.
3. Blow, rotary, vacuum and slush molding.

F. Differentiate between forming, forging, powdered metal and die casting.
1. Precision sheet metal.
2. Drop and press forging.
3. Stamping and punch press processes.

G. Describe various heat treatment processes.
1. Surface and body hardening processes.
2. Etching, cleaning and abrading.
3. Electroplating and electro-painting.

H. Discuss and explore non-traditional machining processes
1. Mechanical energy and electrochemical processes.
2. Thermal and electrical discharge machining (EDM).
3. Virtual form cutting and stereolithography.

Lab Topics

A. Material properties
B. Material selection
C. Material tables/graphs
D. Heat treating
E. Non-traditional machining processes