Ohio Articulation Number (OAN)
Course Submission Form
2005-2006

College/University  Lakeland Community College

Course(s) Submitted (Title & Course #)  MECT 2370 Materials Technology
Ohio Articulation Number  OET013

Date  October 9, 2006  Course 1 of a 1 Course OAN mapping.

Name and title of individual submitting on behalf of the college/university

Name  Marilyn S. Jones  Title  Associate Provost

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Phone  (440) 525-7828
Fax  (440) 525-7657

Credit Hours  3  qtr  X  sem
Lecture Hours  2
Laboratory Hours  2 (if applicable)
Pre-Requisites(s) Course work (if applicable)
MATH 1101 Technical Mathematics I

Placement Score (if applicable)
(Name of test)
(Domain)  (Score)

Catalog/Course Description (Includes Course Title and Course #)
MECT 2370 Materials Technology: This course provides an introduction to metals, plastics, and ceramics commonly used in engineering technology. The course includes materials processing and fabrication, crystal and amorphous structures, relation of processing and heat treatment to internal structure, alloys and solid solutions, use of phase diagrams, prominent properties, and test
Course Objectives and/or Plan of Work

GENERAL COURSE GOALS:
1. Introduce students to the basic concepts of Materials Science and Engineering Technology upon which material and process selection and evaluation of designs are based.

2. Emphasize the interrelationship of properties, structure and processing.

3. Provide students with the background to participate in material and process selection as well as design and assess materials processing sequence.

COURSE OBJECTIVES:
Upon completion of the course, the student should be able to:

1. Describe various physical and mechanical properties that can be studied for engineered materials and explain what types of property testing is required for each type of application.

2. Describe the atomic, crystalline and grain structure of crystalline materials and contrast crystalline and amorphous structures.

3. Describe crystal structure defects and use their properties to explain materials behavior at various temperatures and mechanical loads.

4. Describe interstitial and substitutional alloying principles and draw conclusions on type of alloy any two elements would form and the extent of mutual solubility possible.

5. Describe and use solidification principles in discussing effects of various casting and welding processes on properties and microstructure of alloys.

6. Read and use any binary phase diagram to predict phases present in equilibrium and calculate the volume fractions of the phases present.

7. Describe applications of Fe-C diagram and T-T-T diagrams for carbon steels to predict microconstituents resulting from various heat treating cycles.

8. Describe phases formed in Fe-C system, their properties and the relationships of properties/processing/microstructure for carbon steels; identify these phases in a microphotograph.
9. Explain the role of alloying elements in affecting alloy and special steel properties. Describe the material selection process for various applications, justify material choices for specific applications and offer alternative materials that match the application design criteria.

10. Describe thermo-mechanical processing of steel, plastic deformation mechanism, contrast cold-worked, hot worked and annealed structures.

11. Describe diffusion processing of materials and select appropriate surface treatments and coatings for wear and corrosion resistance.

12. Explain corrosion mechanisms, stainless steels, classification and applications. Contrast alloy steel and stainless steel properties and structure and draw inferences on potential applications based on structure and properties.


14. Describe non-ferrous alloys processing, microstructure, properties and range of applications. Describe Cu, Al and Ni-based alloys and heat treatments employed in these systems to achieve optimal mechanical/physical properties.

15. Describe structure/processing/properties relationship for various ceramics and discuss current and potential applications of ceramic materials.

16. Describe structure/processing/properties relationship for various plastics/polymers and discuss current and potential applications of plastic materials.

17. Utilize thermocouples to measure elevated temperatures.

18. Mount, polish, etch and examine metallographic specimens.

19. Plan and conduct an experiment to study effects of heat treatment on mechanical properties of carbon steel and copper alloys.

Description of Assessment and/or Evaluation of Student Learning

SUGGESTED GRADING PROCEDURES:
Quizzes/Homework-10%
Tests(midterm and final)-60%
Lab Reports-20%
Term Paper/Project-10%

Master Syllabi and Working Syllabi (if both are used)
COURSE NUMBER: MECT2370
COURSE TITLE: Materials Technology

LECTURE          LAB            CLINICAL   TOTAL   OBR MIN
OBR MAX CREDITS: 2.00   1.00   0.00     3.00      3.00
CONTACT HOURS:   2.00   2.00   0.00     4.00

PREREQUISITES:
MATH1101

PROGRAMS & CERTIFICATES FOR WHICH THIS COURSE IS REQUIRED:
9444 - MECT-Computer Assist Prod Design Option

PROGRAMS & CERTIFICATES FOR WHICH THIS COURSE IS AN ELECTIVE:
9440 - MECT-MACHINE DESIGN
9446 - MECT-Heat and Power Option

COURSE ACCEPTED AS TRANSFER CREDIT BY:

RECOMMENDED CLASS SIZE: 15
RATIONALE: LAB CONSTRAINTS

FREQUENCY OF OFFERING: 2 X YEAR
TERMS NORMALLY OFFERED: FALL  SPRING

LAB FEE: 13.00

RATIONALE FOR COURSE:
Mechanical Engineering Technology program graduates will have to be able to use knowledge of materials, structure, properties and the property/structure/processing relationships. They may also need to know the relationship between the properties and the process for materials selection for specific application as well as materials processing selection for the design of components and machinery.
Students of various Certificates in CIM programs may benefit from this course as an elective.

COURSE DESCRIPTION:
This course provides an introduction to metals, plastics, and ceramics commonly used in engineering technology. The course includes materials processing and fabrication, crystal and amorphous structures, relation of processing and heat treatment to internal structure, alloys and solid solutions, use of phase diagrams, prominent properties, and test methods.

GENERAL COURSE GOALS:
1. Introduce students to the basic concepts of Materials Science and Engineering Technology upon which material and process selection and evaluation of designs are based.

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17. Utilize thermocouples to measure elevated temperatures.

18. Mount, polish, etch and examine metallographic specimens.

19. Plan and conduct an experiment to study effects of heat treatment on mechanical properties of carbon steel and copper alloys.

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COURSE OUTLINE:
I. Properties and Structure of Engineered Materials
   A. Physical/Mechanical Properties
   B. Atomic, Crystal Structures, Bonds
   C. Crystal Structures, Defects, Plastic Deformation & Diffusion
   D. Grain Structure, Hot/Cold Working

II. Equilibrium Diagrams
   A. Solidification mechanisms, processes, welding, defects
   B. Alloying mechanisms, types of alloys
   C. Binary systems
   D. Phase equilibrium, lever rule

III. Ferrous Alloys
   A. Fe-C diagram, alloys, microstructures, classification
   B. Heat Treatments, T-T-T diagrams, hardenability
   C. Cast Irons, microstructures, properties
   D. Alloy and Tool Steels
   E. Stainless Steels, Corrosion, Diffusion and Surface Treatments, Coatings
   F. Powder metallurgy

IV. Non-Ferrous Alloys
   A. Cu alloys
   B. Al Alloys
   C. Ni Alloys

V. Ceramic Materials
   A. Structure/Physical Properties
   B. Processing
   C. Applications

VI. Plastics/Polymers
   A. Structure/Physical Properties
   B. Processing
   C. Applications

INSTRUCTIONAL PROCEDURES THAT MAY BE UTILIZED:
1. Lecture
2. Supervised Laboratory Experience
3. Overhead Transparencies
4. Term Paper(with oral presentation)

SUGGESTED GRADING PROCEDURES:
Quizzes/Homework-10%
Tests(midterm and final)-60%
Lab Reports-20%
Term Paper/Project-10%
SUGGESTED COURSE EVALUATION PROCEDURE:
This course will be reviewed biennially by the Department Chairman, the faculty, and the Advisory Committee.

Each semester it will be evaluated by student evaluations.

[ End of Course Outline for 'MECT2370' ]

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COURSE ID: MECT2370
10/09/06
TITLE: Materials Technology

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<tr>
<th>General Education</th>
<th>Methods of Assessment</th>
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| *** KNOWLEDGE *** |

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<tr>
<th>1. Arts and Literature</th>
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<tr>
<td>2. Complexities of Human Behavior</td>
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<td>3. Complexities of Social Institutions</td>
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<td>4. Math and Science</td>
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<td>5. Past and Present Cultures</td>
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<td>6. Technology</td>
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*** CRITICAL THINKING ***

1. Identify Personal Assumptions
2. Identify Ethical Dimensions
3. Examine Issues by Suspending/Challenging Assumptions
4. Evaluate Issues from Various Perspectives
5. Collect, Analyze, Interpret Information
6. Support Hypotheses
7. Synthesize Information
8. Draw Conclusions

*** COMMUNICATION SKILLS ***

9. Speak Clearly and Effectively
10. Read with Comprehension
11. Write Clearly & Effectively in Standard English
12. Work Effectively in Groups
13. Listen Actively and with Understanding
20. Practice Effective Interpersonal Skills

21. Interpret/Use Graphic Communication

22. Use Technology-Based Communication

Methods of Assessment codes:

1. Test/Examination  | 4. Collaborative Writing | 7. Portfolio
2. Homework/Written  | 5. Oral Presentation     | 8. Demonstration of Skills
(specify)

Additional Documentation

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<tr>
<th>OBR Use</th>
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