

**Honolulu Community College  
Marine Education and Training Center  
Boat Maintenance and Repair Program**

## **Course Syllabus**

**Course Name:** Introduction to Composite Technology

**Course Number:** MARR 24

**Course Credits and Hours:** 3 credits; 90 hours lecture/lab

**Prerequisites:** MARR 22

**Course Description:** Covers the fundamentals of working with resins, fabrics, and adhesives. Projects include the fabrication of solid and cored test panels. Methods used to insure quality control in the composites industry are also stressed.

### **Course Objectives:**

Upon successful completion of this course, the student will be able to:

1. Demonstrate ability to safely handle hazardous materials
2. State the practical principals of polyester and epoxy resin chemistry
3. Utilize the principal of specific gravity to perform weight to volume conversions for accurate mixing of components
4. Create a shop catalyzation chart from a resin's product data sheet indicating minimum and maximum catalyst levels in cubic centimeters
5. Properly catalyze resins and add various components (fillers, promoters) to polyester/epoxy resins for differing applications and working conditions
6. Perform gel-time, peak exotherm test, and Barcol hardness tests on resin samples for quality control
7. Identify composite fabrics and state when and why a certain fabric should be utilized
8. Laminate test composite panels and perform weight calculations.

### **Course Outline:**

#### **I. COMPOSITE SAFETY**

- A. Ventilation Considerations
- B. Personal Respirator Selecting, Fitting and Maintenance
- C. Protective Clothing
- D. Fiber Dust Collection

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**II. INTRODUCTION TO COMPOSITE RESINS**

- A. Epoxies
- B. Vinyl esters
- C. Polyesters

**III. POLYESTER CHEMISTRY**

- A. Polymerization
- B. Accelerators
- C. Inhibitors
- D. Catalyzation
- E. Product Data Sheets

**IV. CATALYZATION RATIOS**

- A. Specific Gravity
- B. Metric Mixing
- C. Creating a Mixing Graph

**V. LAMINATION**

- A. Fabric Types and Selection.
- B. Glass to Resin Ratios.
- C. Material Estimates

**VI. QUALITY CONTROL**

- A. Barcol Hardness Meter
- B. Failure Testing
- C. Gel Time Tests

**Evaluation:**

Standard Alpha System:

- A 94-100
- B 88- 93
- C 80- 87
- D 70- 80
- F below 70

Evaluation by percentages:

40% - Hands on projects and exercises; graded for accuracy, neatness and attention to detail.

40% - Written tests; given to determine understanding of principals

20% - METC's Work Habits Evaluation

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The evaluation addresses behavior such as “Does the student report to class on time and prepared? Does the student use lab time wisely? Does the student cooperate with the instructor and team members? Is METC policy followed? Does the student participate in class discussions?”

Many handouts will be issued to you throughout your career at the METC. It is imperative that you keep a three ring binder with labeled dividers. During some written tests you will be allowed to refer to your notes. You will also find it beneficial to refer to your notebook while executing projects. Your notebook will directly effect your written and "hands on" project scores. Your notebooks will periodically be turned in and evaluated.

Prompt attendance is vital to your success. Many "hands-on" projects and demonstrations simply can not be repeated. The table below demonstrates how absences and tardiness will limit how high a grade you will be eligible to receive for this course.

<b>If you miss:</b>	<b>You are eligible for a(n)</b>
5 hours or less	A
10 hours or less	B
15 hours or less	C
20 hours or less	D
More than 20 hours	F

Each Tardy will equal 1/2 Hour absent. This includes being late returning to class from break.

Please call to inform if you are going to be absent. Many of our projects are tackled as a team. We need to know if a team member is going to be absent. The answering machine is on phone # **832-3682**.

If you do not call to notify of your absence and there is a test, and you are granted permission to take a make-up test, a 14 point (based on 100 pt. scale) penalty can be deducted from your make-up score. Be advised that any make-up exam administered may be different in format from the original exam, and may include oral examination.

**Textbooks:**

Polycor, *Polyester Products Application Manual*, 10<sup>th</sup> edition,  
(Cook Composites and Polymers, PO Box 419389 Kansas City, MO. 641141-6389)