

Course Syllabus

Course Name: Composite Tooling

Course Number: MARR 43

Course Credits and Hours: 4 credits; 120 hours lecture/lab

Prerequisites: MARR 40, 41

Course Description: Uses the mold stations and stem form built in MARR 41 to erect a hull skeleton on a building form. Transom fabrication is learned. A skin or planking of foam or wood is applied. Spiling techniques are emphasized. Fairing of the hull/plug is practiced. Modern plug fabrication techniques will be discussed. The end product of this course is the creation of a production quality tool (plug).

Course Objectives:

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

1. Calculate material(s) needed to construct the tool/plug
2. Understand the importance of “fairness” as it relates to plug fabrication
3. Prepare a plug for mold fabrication
4. Demonstrate hand lamination techniques
5. Understand and fabricate plug flanges for reinforcing of the plug
6. Application of plug tooling surface coatings
7. Practice fairing techniques

Course Outline

- I. PLUG CONSTRUCTION
 - A. Ribband/Stringer Placement
 - B. Planking Methodologies
 1. Strip Planking
 2. Sheet Plywood
 3. Cold Molding
 4. Foam
 - C. CNC Plug Fabrication
 1. 3 & 5 Axis Routers
 - D. Plugs for Foils

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1. Half plug
- E. Using Existing Component(s) as a Plug

II. FAIRNESS

- A. Practice Fairing Techniques
- B. Stress Importance of Having the Tool Fair

III. HAND LAMINATE TECHNIQUES IN PLUG FABRICATION

- A. Fiber/Resin Ratios
- B. Fillers used in Tool Fabrication
- C. Specific Tools for Hand Laminating

IV. APPLICATION OF FLANGES

- A. Reasoning for Flanges
 1. Laminate extension
 2. Stiffening of Mold
- B. Split Molds
 1. Ease of Using the Mold
 2. Removal of Part
 3. Drafting Requirements
- C. Auxiliary Flanges
 1. Use
 2. Fabrication
- D. Installation of Flanges
 1. Hot glue
 2. Backing Blocks

V. PLUG SURFACING

- A. Surface Defects
 1. Repairing
 2. Re-fairing
- B. Polishing and Buffing
 1. Reasons
 2. Techniques & Materials
- C. Plug Waxing
 1. Reasons
 2. Number of applications

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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 are graded for accuracy, neatness, and attention to detail.

40%- Written tests are given to determine understanding of principals.

20%- METC Work Habits and Rating Scale*

*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.

If you miss:	You are eligible for a(n)
7.5 hours or less	A
11.5 hours or less	B
16.5 hours or less	C
21.5 hours or less	D
More than 21.5 hours	F

Each Tardy will equal 1/2 Hour Absent. This includes being late to returning to class after a designated 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**.

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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.

Required Textbooks:

Fiberglass Boatbuilding For Amateurs, Ken Hankinson, Glen-L Publishing

Gougeon Brothers On Boat Construction, Meade Gougeon, Pendell Printing, Inc.