# Research and reconstruction of Wooden Ships



#### 01.01 Introduction - Syllabus

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# **Syllabus and course requirements:**

Weeks 2 and 3 – Lines drawings

Project Number 1: Elementary Lines

<u>Project Number 2</u>: Slightly More Complicated Lines

Week 4 – Hull analysis

Project Number 3: Hull Calculation





#### Project Number 1: Elementary Lines

Draw the lines of a generic hull, 45 cm long, 15 cm in beam. There should be two waterlines, one buttock line, at least five sections, and a single diagonal. Do not worry about keels, rabbets, or any other refinements. The primary goal here is to produce a set of fair, properly justified lines. This drawing should be properly titled, dated and signed.

The project is due at the beginning of class in Week 5.





#### Project Number 2: Slightly More Complicated Lines

Draw the lines of a vessel 20 meters long, six meters in beam, with a draft amidships of 2.2 meters. The vessel should have a transom and a rabbeted keel, stem, and sternpost. There should be a deck, and the location of its outboard edge should be indicated by a dashed line on all three views. Draw this vessel at scale 1:50, and provide a graphic scale of the proper form. The drawing will be graded on the basis of accuracy (agreement of points between views; each point out of agreement by more than 0.5 mm is 1.6 points off), completeness, fairness, and neatness. This drawing should be properly titled, dated, and signed.

The project is due at the beginning of class in Week 5.





#### Project Number 3: Hull Calculation

Calculate the displacement and basic hull coefficients (block, prismatic, midships, waterplane) for the hull drawn for Project Number 2. You may submit the results either as a separate sheet, or as a neat table on the drawing itself.

The project is due with Project Number 2 at the beginning of class in Week 5.





Week 5 – Recording shipwreck sites and hull structures <u>Project Number 4</u>: Mapping

Week 6 and 7 – Recording timbers and fragments <u>Project Number 5</u>: Fragment Recording

Week 8 – Recording entire structures

Project Number 6: Capturing Curves





Project Number 4: Mapping

In groups of two, map a scatter of timbers on the floor of the Ship Lab using two different methods:

- 1) triangulation and
- 2) direct survey measurement (DSM).

First define the parameters of the "site" by mapping the room and preparing a plan view of the room that shows the locations of the datums. Then record a sufficient number of points on each timber so that its orientation can be accurately determined within the plan view of the site.



#### Project Number 4: Mapping

Your two plans (one for triangulation, one for DSM) are to be drawn at 1:10, must include a sketch of each timber (with its field number and its measured points clearly identified), and must also include the datum points, a north arrow, a metric scale, and a title block. Include, as well, a table for each plan that lists the measurements from each datum to each measured point, the measurements taken to map the outline of the room, and the measurements between datum points.

The project is due at the beginning of class in Week 9.







#### <u>Project Number 5</u>: Fragment Recording

Record a fragment of a timber from the Ship Lab shelves. This should include one letter format data recording sheet and a 1:10 scale drawing with at least 3 views and one section showing the wood grain.

The project is due at the beginning of class in Week 9.



5. Fragment Recording







#### Project Number 6: Recording Curves

In this assignment, you will record a frame using three different methodologies:

- 1) offsets, using a horizontal datum and plumb bob;
- 2) a bevel-gauge goniometer; and
- 3) a digital goniometer.
- From your "field" data you will prepare a drawing showing the three frame sections, sequentially and not superimposed, at a scale of 1:10.



#### Project Number 6: Recording Curves

The horizontal plane must be indicated, as well as the angle of list as determined from the top of the keel. Selecting the section you feel is most accurate, you will then prepare a complete section drawing of the frame at 1:10 showing its molded dimensions, the overlap and fastening of the floor and futtock, as well as the dimensions, locations, details of the keel and planking. In addition to the pencil drawing of the detailed section, prepare a carefully inked publishable copy on Mylar.



#### Project Number 6: Recording Curves

All three of your completed section drawings must include metric and Imperial scales, as well as a title block. Finally, prepare tables of offsets, segment measurements (bevel gauge goniometer), or attitude readings (digital goniometer).

Project No. 6 Checklist:

Pencil drawing showing three frame curvatures. Pencil drawing of detailed frame section Inked drawing of detailed frame section. Tables of offsets and goniometer measurements and readings.

The project is due at the beginning of class in Week 11.

# 6. Recording Curves











Week 9 – Recopying and drafting field notes

Week 10 – Publishing hull remains

Week 11 – Reconstructing ship's hulls

Week 12 – Models and full-scale replicas





Week 13 – Hull recovery, conservation, reassembly and display

#### Term Project Due at the beginning of class!

Week 14 – Computers and interpretive drawings

End of the semester.



#### Final Project

- 1. A complete set of lines;
- 2. Hull calculations;
- 3. Construction plans:
  - a. Longitudinal section;
  - b. Two transverse sections (one at the widest point on the hull);
  - c. Plan of main deck.



#### Final Project

- 1. It must be built of wood.
  - 2. No dugouts, rafts, birch bark canoes, etc.
  - 3. No pleasure craft.
- 4. It must be at least 10 meters long, but no more than 40 meters.
  - 5. It should not have elaborate castles or deck structures.
  - 6. It may not be a specific vessel for which plans already exist,
- or a direct copy of such.





#### Checklist for submission:

□ Drawings (lines, construction, deck)

□ Title blocks on all drawings

□ Written analysis and bibliography

- Principal dimensions
- Scantling list

 Calculated displacement and hull coefficients (with worksheets showing calculations)

#### Written portion:

A short-written report, about 2,000 words. Presented in the IJNA format, Times New Roman 12, 1.5 line spacing, no indented paragraphs, 6 points after every paragraph, with a cover, blank last page, and bound:

- 1. Introduction
- 2. Description of the vessel chosen
- 3. Research
- 4. Final result
- 5. Hull Analysis
  - 1. Principal dimensions
  - 2. Scantling list
  - 3. Hull calculations
  - 4. Coefficients
- 6. References



# 1. Lines Drawings



PLAN I. Almere Wijk 13 Conventional Hull Lines (to upper, inboard edges of strakes). As in all other drawings of this hull, the port side is represented.



# 2. Hull Analysis







# 3. Ship Project Example: Fred Hocker's Almere Wijk 13





PLAN III. Almere Wijk 13 Longitudinal Construction Section. Deck structures and the exact arrangement of the stern framing are largely conjectural.







PLAN IV. Almere Wijk 13 Exterior Profile.









PLAN V. Almere Wij 13 Deck and Framing Plan.

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Figure 11. Almere Wijk 13 construction section amidships and at sailbeam.



# 3. Ship Project Example: Fred Hocker's Oost Flevoland B 71



PLAN VII. Oost Flevoland B 71 Hull Lines (to inside of plank). All drawings are of the starboard side.









PLAN VIII. Oost Flevoland B 71 Longitudinal Construction Section.









PLAN IX. Oost Flevoland B 71 Exterior Profile.









PLAN X. Oost Flevoland B 71 Deck Plan.







Figure 16. Oost Flevoland B 71 construction section amidships and at sailbeam.





# 4. Term Paper

Title	3.
Name	3.1
	evi
1. Introduction	
	3.2
2. The Vessel	evi

3. Research
3.1. Documental
evidence

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3.2. Archaeological evidence
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**4. Reconstruction** *4.1. Lines Drawings* 

4.2. Hull Analysis

4.3. Discussion

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4.4. Hull Reconstruction Scantling List

Construction Drawings

5. Conclusion

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# Next Class: Lines Drawings

**Lecture:** Understanding Hull Lines: Sheer, Half Breadth and Body Plan.

Reading: Steffy, Wooden Ship Building, pp. 8-20.

**Assignment:** Start preparing for Project No. 1: buy all the drafting equipment, clean your drawer at the Ship Lab, and look at ship's lines drawings.

Project No. 1 due by Week 5.