

Outline

Outboard Power Head System
Course Title

SE 213
Dept. & Course No.

I. COURSE DESCRIPTION:

This course introduces power head designs and functions on a variety of outboard makes and models. Topics include complete outboard power head cylinder blocks; crankshafts, bearings pistons and connecting rod assembly systems and techniques to test/troubleshoot power head components. Students should be able to troubleshoot, test and rebuild power head systems with specific attention to parts identification, tolerance, inspection, assembly and installation.

II. SEMESTER CREDITS: 3

III. CONTACT HOURS PER WEEK: 1 6 7
Lec Lab Total

IV. PREREQUISITES: SE122

V. STUDENT LEARNING OUTCOMES:

COURSE CONTENT:

VI.

Upon the completion of the course, the students will be able with 65% accuracy to:

1. Identify and describe outboard engine power head; remove, service, repair, and install power head.
 2. Explain and identify crankshaft components; inspect and check C-shaft tolerance.
 3. Explain difference between types of bearing; inspect, and replace bearing installation techniques.
 4. Explain and identify piston types and rings, check, remove, and install piston rings.
 5. Identify and explain different types of outboard engine block, check and perform cylinder honing.
- A. Reconditioning
 1. Disassemble & Reassemble
 2. Replace worn parts
 3. Tune-up
 4. Test run
 - B. Crankshaft
 1. Counterweight
 2. Crankshaft, upper center and main journals
 - C. Bearings
 1. Needle bearings
 2. Ball bearings
 - D. Pistons
 1. Cross scavenging
 2. Loop charge
 3. Piston rings
 - E. Engine block
 1. Aluminum block
 2. Aluminum with sleeve

VII. MATERIALS AND EQUIMENTS

- A. Outside micrometer
- B. Inside micrometer
- C. Drill press
- D. Arbor press
- E. Outboard engine
- F. Timing light
- G. Parts (New & Old)

VIII. TEXTS

Required Text(s)

Roth, Alfred C. Small Gas Engines. South Holland, Illinois. The Goodheart-Wilcox, 2012.

IX. METHOD OF INSTRUCTION

- A. Lecture
- B. Laboratory work
- C. Demonstration/discussion
- D. Reinforcement/Enrichment activities

X. METHOD OF EVALUATION

The components with corresponding weight in percent included in the computation of the total grade:

Final Exam	15%
Mid-term	15%
Tests and homework	20%
Projects	<u>50%</u>
Total	100%

Transmutation of percent to letter grade is as follows:

- 90 - 100 = A
- 80 - 89 = B
- 70 - 79 = C
- 65 - 69 = D
- 0 - 64 = F

TASKS

SE213 Outboard Power Head Systems

Course No and Title

Credits:

1

Lec

2

Lab

96

Total Lab Hrs.

SLO #1

23 hrs

1. Remove and install power heads
2. Check and replace worn parts
3. Check and adjust or repair malfunction parts
4. Disassemble and reassemble the power head
5. Remove, check cylinder for scratches and install
6. Remove and install wrist pin & bearings
7. Test, run and tune-ups

SLO #2

20 hrs

1. Remove, check and install seal rings
2. Check counterweight for water
3. Measure and check journal for pitted, wear and out of round

SLO #3

10 hrs

1. Remove and inspect bearings
2. Replace and install

SLO #4

21 hrs

1. Describe and explain types of piston
2. Check ring grooves clearance
3. Check piston roundness
4. Remove and install
5. Check piston land for nick and wear

SLO #5

22 hrs

1. Check cylinder walls for cracks, scores and scratches
2. Check and identify blocks with sleeves and without sleeves
3. Demonstrate how to hone cylinder with honing stone
4. Hone cylinder with honing stone

Palau Community College
SE 213 Outboard Power Head Systems
Course Learning Outcomes

During the course experience, the **course learning outcomes** (CLOs) will be assessed through the use of signature assignments. A rating scale will be used to determine the students' proficiency level of each CLO using specifically aligned assignments. The numerical ratings of 4, 3, 2 and 1 are not intended to represent the traditional school grading system of A, B, C, D and F. The descriptions associated with each of the numbers focus on the level of student performance for each of the course learning outcomes listed below.

Rating Scale: 4 Outstanding
3 Proficient
2 Developing
1 Emerging

Course Learning Outcome 1: Students will be able to remove, service and repair an outboard power head.

Outstanding 4	With full understanding, demonstrates knowledge of the operation of major powerhead components. Independently removes and refits an outboard powerhead. Confidently services and repairs all major components of a powerhead.
Proficient 3	With fair understanding, demonstrates knowledge of the operation of major powerhead components. Can remove and refit an outboard powerhead with minimal assistance and can service and repair all major components of a powerhead.
Developing 2	Understands the operation of most major powerhead components. Can remove and refit an outboard powerhead with constant assistance and can service and repair most major components of a powerhead.
Emerging 1	Understands the operation of some major powerhead components. Can remove and refit an outboard powerhead with supervision and instruction. Can service and repair some major components of a powerhead with supervision and instruction.

Course Learning Outcome 2: Students will be able to identify, inspect and check crankshafts, bearings, pistons and cylinder blocks.

Outstanding 4	With full understanding, readily identifies all internal components and parts of an outboard powerhead and is able to inspect and check crankshafts, bearings, pistons and cylinder blocks and detect current problems and likely future problems with accuracy. Confidently services and repairs where possible each of these items.
Proficient 3	With fair understanding, identifies all internal components and parts of an outboard powerhead and is able to inspect and check crankshafts, bearings, pistons and cylinder blocks and detect most current problems and some likely future problems with accuracy. Services and repairs where possible each of these items.
Developing 2	Identifies most internal components and parts of an outboard powerhead and is able to inspect and check crankshafts, bearings, pistons and cylinder blocks and detect some current problems. Services and repairs where possible some of these items.
Emerging 1	Can identify only a few internal components and parts of an outboard powerhead and is able to inspect and check crankshafts, bearings, pistons and cylinder blocks and detect some current problems if supervised by the instructor. Can assist an instructor to service and repair these items.