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Basic Engine Principles Course Title SE112 Dept. & Course No.

I. COURSE DESCRIPTION:

This course covers principles of theory and operation and skills relating to repair and maintenance of basic outboard marine engines.

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II. SEMESTER CREDITS: 3

III. CONTACT HOURS PER WEEK: 2 3 5 Lec Lab Total

IV. PREREQUISITES: None

V. STUDENT LEARNING OUTCOMES:

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

- 1. Explain theory & principles of both two and four cycle engines.
- A. Two & Four Cycle Engine

COURSE CONTENTS:

- 1. Intake-stroke
- 2. Compression stroke
- 3. Power stroke
- 4. Exhaust stroke
- B. Power Head
 - 1. Cylinder block
 - 2. C-shaft
 - 3. Piston
 - 4. Con-rod
 - 5. Piston pin
 - 6. Labyrinth ring
- C. Break-In
 - 1. Fuel and oil ratio
 - 2. Number of hours
 - 3. Torque specs
 - 4. Oil changing & types oil
- D. Lubrication
 - 1. Throttle linkage
 - 2. Bracket and swivel
 - 3. Cover latch
 - 4. Gear box oil change
 - 5. Type of gear case
 - 6. Types of oil

2. Explain differences of power head components for different types of engines.

- 3. Explain and demonstrate engine break-in procedures for two & four cycle engines.
- 4. Demonstrate and explain lubrication points as well as oil changing.

ycle engines.

- 5. Demonstrate, explain & repair engine lost overboard. (submerged motor in salt water or fresh water).
- E. Submerged Motor
 - 1. Disassemble number power unit.
 - 2. Repair and replace internal components
 - Overhaul every unit if necessary or replace

VII. MATERIALS AND EQUIMENTS

- A. Outboard engine of any kind
- $B.\ 2hp-275hp$
- C. Impeller housing
- D. Impeller (synthetic rubber)
- E. Sealant (form a gasket type)
- F. Impeller key
- G. Routine classroom materials

VIII. TEXT(S)

Required Text(s)

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

IX. METHOD OF INSTRUCTION

- A. Lectures
- B. Guest Speakers
- C. Laboratory work
- D. Audio/Visual
- E. Demonstration/Discussion
- F. Individualized instruction
- G. 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	50%
Total	100%

Transmutation of percent to letter grade is as follows:

90 - 100 = A 80 - 89 = B 70 - 79 = C 65 - 69 = D0 - 64 = F

TASK LIST

SE112 – Outboard Power H Course No & Title	ead Systems	Credits:	2 Lec	 Lab	48 Total Lab Hrs.
 SLO #1 1. Remove and ident 2. Service, repair en 3. Disassemble & Reassembly of the 	gine block eassemble com-rod t				11 hrs
 Disassemble pisto Identify piston for 	ify movement for ea on and the rod two & four cycle en oble and service C-s	ngines		ur cycle e	11 hrs
	essary components r	quired for brea	ak-in pro	cedures,	based on
SLO #4 1. Disassemble, clea 2. Remove the spark 3. Disassemble & re	-	rstem			11 hrs

SLO #5

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4 hrs

- 1. Read and become familiar with the service manuals for the major engine types available in Palau
- 2. Read and become familiar with the parts manuals for the major engine types available in Palau

Palau Community College SE112 Basic Engine Principles 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	2 Developing
	3 Proficient	1 Emerging

Course Learning Outcome 1: Students will be able to service and repair an outboard engine powerhead.

Outstanding	Fully understands and can explain the theory and principle of both two and four cycle engines. Fully understands the
4	operation of major powerhead components. Confidently services and repairs all major components of a powerhead.
Proficient	Understands the theory and principle of both two and four cycle engines. Understands the operation of major powerhead
3	components. Services and repairs all major components of a powerhead with limited supervision.
Developing	Has some understanding of the theory and principle of both two and four cycle engines. Can identify the major powerhead
2	components. Can service and repair most major components of a powerhead with some supervision.
Emerging	Has some knowledge of the theory and principle of both two and four cycle engines. Can identify most of the major
1	powerhead components. Can only assist in the service and repair of most major components of a powerhead.

Course Learning Outcome 2: Students will be able to understand outboard lubrication points and perform break-in procedures.

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		Fully understands the need for break-in procedures and can demonstrate and explain the procedures competently for both
	A	two and four-cycle engines. Has full knowledge of fuel/oil ratios, torque specifications and the need for the use of different
	4	oils. Knows the location and operation of all lubrication points.
	Proficient	Understands the need for break-in procedures and can demonstrate and explain the procedures for both two and four-cycle
	2	engines with very minor errors. Has knowledge of fuel/oil ratios, torque specifications and the need for the use of different
	3	oils. Knows the location and operation of most lubrication points.
	Developing	Knows of the need for break-in procedures and can explain the procedures for either two or four-cycle engines with minor
	2 Developing	errors. Has some knowledge of fuel/oil ratios, torque specifications and the need for the use of different oils. Knows the
	2	location and operation of some lubrication points.
	Emerging	Knows of the need for break-in procedures and can complete some aspects of the procedures under supervision. Has some
	1	knowledge of fuel/oil ratios, torque specifications and the need for the use of different oils. Knows the location and operation
		of some lubrication points.

Course Learning Outcome 3: Students will be able to revive a submerged engine.

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Outstanding	Competently explains and demonstrates the procedures necessary to recover a submerged engine. Knows which
4	components need replacement and which ones need repair. Overhauls all damaged units as necessary.
Proficient	Explains and demonstrates most procedures necessary to recover a submerged engine. Knows which components need
3	replacement and which ones need repair. Can overhaul all damaged units as necessary.
Developing	Can demonstrate most procedures necessary to recover a submerged engine. Knows which components need replacement
2	and which ones need repair. Can overhaul the most basic units under supervision.
Emerging	Knows some procedures necessary to recover a submerged engine. Knows that some components need replacement or
1	repair. Needs supervision to overhaul even the basic units.

Course Learning Outcome 4: Students will be able to understand and use service manuals and parts catalogues.

Outstanding 4	Reads and understands all relevant service manuals and capably follows the instructions contained in them. Can offer explanations based on the service manual and is conversant with parts manuals and able to quickly order the relevant and necessary parts. Knows how to accurately arrange the manuals and parts catalogues in a special workshop area. Fully understands a service policy.
Proficient 3	Reads and understands most relevant service manuals and follows the instructions contained in them. Is conversant with parts manuals and is able to order the relevant and necessary parts. Understands most main points of a service policy.
Developing 2	Can read and understand the most basic service manuals and follow most of the instructions contained in them. Can read parts manuals with some assistance and assist in the ordering of parts. Is aware of the need for a service policy.
Emerging 1	Needs help to read, comprehend and follow basic service manuals. Can follow the instructions only with assistance. Understands some of the basics of a parts manual. Unclear of the need for a service policy.