_____SOUTH SEATTLE COMMUNITY COLLEGE_____

Academic Programs

COURSE OUTLINE
Revision: Mike Steffancin, February 2008

DEPARTMENT:	Academic Programs
CURRICULUM:	Engineering
COURSE TITLE:	Thermodynamics
COURSE NUMBER:	ENGR& 224
TYPE OF COURSE:	Academic Transfer
COURSE LENGTH:	1 quarter
CREDIT HOURS:	5
LECTURE HOURS:	55
LAB HOURS:	0
CLASS SIZE:	24
PREREQUISITES:	PHYS& 221, CHEM& 161 and MATH& 153

COURSE DESCRIPTION:

Introduction to thermodynamics from a macroscopic point of view. Development of the laws of thermodynamics and applications to energy transformations and state changes.

STUDENT LEARNING OUTCOMES ADDRESSED:

1. Computation – Students will use mathematics appropriate for their field of study during in-class activities and homework. This includes calculus and differential equations.
2. Communication – Students will get practice in both written and verbal communication through readings of technical documents and group activities.
3. Critical Thinking and Problem Solving – Students will learn to think critically to help them solve problems assigned as homework, group work and other in-class worksheets.

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STUDENT LEARNING OUTCOMES ADDRESSED: (cont.)

4. Technology – Students will use calculators, computers and the Internet to investigate topics. Students will also use MATLAB to model problems.
5. Information Literacy – Students will learn to access and evaluate information from a variety of sources including their book, the Internet and other class handouts.

GENERAL COURSE OBJECTIVES:
At the end of the course the student will be able to:

1. Determine the properties of pure substances using thermodynamic tables.
2. Use the ideal gas law.
3. Calculate changes in internal energy and enthalpy using specific heats.
4. Calculate the work done by a closed system via integration.
5. Apply the first law of thermodynamics to a closed system.
6. Apply the first law of thermodynamics to an open system.
7. Analyze the Carnot, Otto, and Rankine thermodynamic cycles.
8. Apply the second law of thermodynamics.
9. Calculate changes in entropy using thermodynamic tables.
10. Calculate changes in entropy for ideal gases.
11. Understand how an automobile engine runs, how a utility plant generates electricity, and how a refrigerator keeps the icebox cold.
12. Analyze the performance of an engine, a power plant, or a refrigerator by applying the first law of thermodynamics.
13. Determine the fundamental limits on the operation of these devices using the second law of thermodynamics.

TOPICAL OUTLINE:		APPROX. HOURS
I.	Basic concepts of thermodynamics	3
II.	Properties in pure substance	6
III.	First law of thermodynamics for closed systems	6
IV.	First law of thermodynamics for control volumes	8
V.	Second law of thermodynamics; Carnot Cycle; Thermodynamic temperature scale	8
VI.	Concept and calculation of entropy	6
VII.	Gas power cycles	6
VIII.	Vapor and combined power cycles	6
IX.	Refrigeration cycles	6

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DATE: February 2008

Course Prefix and Number: ENGR& 224
Course Title: Thermodynamics

SLO #	Included in Course Objective Number	SSCC Student Learning Outcomes
SLO 1.1	1-13	Communication - Read and listen actively
SLO 1.2		Communication - Speak and write effectively
SLO 2.1	1-13	Computation - Use mathematical operations
SLO 2.2	1-13	Computation - Apply quantitative skills
SLO 2.3	1-13	Computation - Identify, interpret, and utilize higher level mathematical and cognitive skills
SLO 3.1		Human Relations - Use social interactive skills to work in groups effectively
SLO 3.2		Human Relations - Recognize the diversity of cultural influences and values
SLO 4.1	1-13	Critical Thinking and Problem Solving -
SLO 5.1		Technology - Select and use appropriate technological tools
SLO 6.1		Personal Responsibility - Be motivated and able to continue learning and adapt to change
SLO 6.2		Personal Responsibility - Value one's own skills, abilities, ideas and art
SLO 6.3		Personal Responsibility - Take pride in one's work
SLO 6.4		Personal Responsibility - Manage personal health and safety
SLO 6.5		Personal Responsibility - Be aware of civic and environmental issues
SLO 7.1	1-13	Information Literacy - Access and evaluate information
SLO 7.2	1-13	Information Literacy - Use information to achieve personal, academic, and career goals, as well as to participate in a democratic society

PREPARED BY: Mike Steffancin
DATE: May 2008