ME 3720 Introduction to Fluid and Thermal Engineering (Elective for non-ME majors)

Catalog Description: ME 3720 Introduction to Fluid and Thermal Engineering (3-0-3)

Prerequisites: CHEM 1310 General Chemistry, PHYS 2211 Introduction to Physics I, and MATH 2403 Differential Equations

Theory and application, but no exhaustive treatment of fluid mechanics, thermodynamics, and heat transfer in analysis and design of fluid and thermal energy systems.

Textbook: M. J. Moran, H. N. Shapiro, B. R. Munson, and D. P. DeWitt, *Introduction to Thermal Systems Engineering – Thermodynamics, Fluid Mechanics, and Heat Transfer*, John Wiley and Sons, 2003.

Topics Covered:

1. Introduction and basic principles including mechanics and fluid statics.
2. Thermodynamic concepts and principles.
3. Thermodynamic and transport properties.
4. First and second laws of thermodynamics, energy and entropy analysis.
5. Control volume analysis.
6. Fluid statics.
7. Introductory fluid dynamics.
8. Continuum analysis.
9. Internal and external flows and convection principles.
10. Conduction, thermal resistance, and transient analysis.
11. Forced convection and the basics of thermal radiation.
12. Analysis of thermal fluid systems and components.

Course Outcomes:

Outcome 1: Achieve an understanding of the scientific principles of fluid mechanics, thermodynamics, and heat transfer.

1.1   Students will demonstrate an understanding of the principles of fluid mechanics, thermodynamics, and heat transfer.

Outcome 2: Apply basic fluid mechanic, thermodynamic, and heat transfer principles and techniques, including the use of empirical data and property tables, to the analysis of representative fluid and thermal energy components and systems.

2.1   Students will demonstrate an ability to apply the principles of fluid mechanics, thermodynamics, and heat transfer and to use empirical data and property tables in the analysis of typical fluid and thermal energy components and systems.

Outcome 3: Apply basic fluid mechanic, thermodynamic, and heat transfer principles and techniques, including the use of empirical data and property tables, to the design analysis of auxiliary fluid and thermal energy components and systems representative of the systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

3.1 Students will practice the application of the principles and techniques of fluid mechanics, thermodynamics, and heat transfer and the use of empirical data and property tables in the design analysis of typical auxiliary fluid and thermal energy components and systems encountered in relevant engineering disciplines.

Correlation between Course Outcomes and Student Outcomes:

ME 3720										
Mechanical Engineering Student Outcomes										
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Outcome 1.1	X							X		X	
Course Outcome 2.1	X				X			X			X
Course Outcome 3.1	X		X		X						X

GWW School of Mechanical Engineering Student Outcomes:

(a) an ability to apply knowledge of mathematics, science and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multidisciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Prepared by: Asegun Henry