## PURDUE UNIVERSITY.Department of<br/>Civil and Mechanical<br/>Engineering

Course	ME 42400 – Design and Optimization of Thermal Systems
Type of Course	Elective for ME program
Catalog Description	Application of the principles of thermodynamics, fluid mechanics, and heat transfer to the design of thermal systems with an emphasis on modeling, simulation, economic analysis, and optimization. Systems to be studied include heat exchangers, thermal storage devices, fluid machinery, pipes and ducts, and electronics cooling devices.
Credits	3
Contact Hours	3
Prerequisite Courses	ME 30100 and ME 32100
Corequisite Courses	None
Prerequisites by Topics	Heat Transfer and Thermodynamics II
Textbook	Thermodynamics, Fluid Mechanics, and Heat Transfer texts Chapters from the FE Reference Handbook
Course Objectives	To introduce the students to the design of thermal systems; to prepare students to develop computer models of systems; and to perform economic analysis of systems
Course Outcomes	<ul> <li>Students who successfully complete this course will have demonstrated an ability to: <ol> <li>Integrate thermal component models and simulate a thermal system.</li> <li>Perform an economic analysis of a thermal system.</li> <li>Use the computer to solve thermal system models.</li> <li>Communicate thermal system designs both orally and in writing.</li> <li>Communication procedures and design optimized thermal systems.</li> <li>Understand some of the ethical and societal issues associated with decision making and be aware of recent developments in area of thermal systems.</li> </ol> </li> </ul>
Lecture Topics	<ol> <li>Introduction and design process</li> <li>Numerical modeling</li> </ol>

	<ol><li>Review of thermodynamics—compression and power production</li></ol>
	4. Thermoeconomic analysis
	5. Engineering economics
	6. Heat exchangers
	7. Piping systems
	8. Optimization
	9. Misc. applications: electronics cooling, solar energy, etc.
Computer Usage	High
Laboratory Experience	None
Design Experience	Medium
Coordinator	Donald Mueller, Ph.D., P.E.
Date	27 June 2018