

Suggested Courses for ME Students Interested in Thermal/Fluids Sciences:

Technical Electives:

A limit of 6 credits of List #2 technical electives can be used to satisfy the 15 credits of technical electives required to earn a BSME degree. There is no limit in List #1 technical electives. Be sure to consult the current list of approved technical electives for the year in which you plan to graduate to make sure the courses listed below are valid technical electives.

List #1 Technical Electives:

AOE 3104 – Aircraft Performance (3 credits) Spring only.

Performance of aircraft. Analysis of fluid statics and dynamics affecting aircraft performance. Hydrostatics of the standard atmosphere and development of basic equations of fluid dynamics. Lift and drag. Aircraft static performance. Rates of climb, endurance, range, take off and landing, and turn performance. Pre: AOE 2104 or AOE 2204, and ESM 2104. Co: ESM 2304. This course may be course restricted.

AOE 3204 – Naval Architecture (3 credits) Spring only

Buoyancy of ocean vehicles. Hull geometry, line drawings, coefficients of form. Hydrostatic calculations, development of a computer program for hydrostatic analysis. Review and calculations. Intact and damaged stability of ocean vehicles. Large angle stability. Stability criteria. Viscosity. Stress in a fluid. Basic laws of fluid dynamics. Pre C- or better: ESM 2104, MATH 2224 or 2204, AOE 2104 or 2204, and AOE 2074. This course may be restricted by major.

AOE 4064 – Fluid Flows in Nature (3 credits) Spring only.

Course designed to build upon and broaden a basic traditional engineering knowledge of fluid flows into areas concerning a variety of natural occurrences and phenomena that involve fluid motions in important ways. Drag of sessile systems and motile animals, gliding and soaring, flying and swimming, internal flows in organisms, low Reynolds number flows, fluid-fluid interfaces, unsteady flows in nature and wind engineering. Pre: AOE 3014 or CEE 3304 or ESM 3024 or ME 3404.

ME 4154 – Industrial Energy Management (3 credits) Spring only.

Survey of energy-intensive technologies used in typical industrial plants, with emphasis on cost-effective energy conservation. Burners, boilers, pumps, air compressors, electric motors, lights, refrigeration plants, HVAC systems, cogeneration systems, waste heat recovery equipment. Energy-efficient design and operation. Determination of energy efficiency based on field measurements. Economic analysis of energy conservation measures. Mitigation of environmental impacts. Pre: ME 3114 or ME 3124 or ME 3134 or CHE 2164 or BSE 3154. This course is offered every other year.

ME 4164: Energy Systems for Buildings (3 credits) Spring only.

Application of the fundamental principles of thermodynamics, heat transfer, and fluid flow to analyze energy use for building environmental control. Exploration of approaches for configuring basic thermal-fluid engineering components (e.g. pumps, piping, fans, heat exchangers,

Introduction to techniques and software tools for estimating energy use by these systems and the associated economic and environment impact. Examination of alternate technologies for meeting building energy needs including small scale combined heat and power systems and renewable energy systems. Pre: ME 2124, ME 3124.

ME 4204 – Internal Combustion Engines (3 credits) Spring only.

Analysis and design of gasoline and diesel engines. Fundamental processes and their application in current technology. Thermodynamics: air standard and air-fuel cycles. Combustion: stoichiometry, fuels, chemical equilibrium, chemical kinetics, flame propagation, knock, pollutant formation and control. Flow processes: volumetric efficiency, intake and exhaust tuning, two-stroke scavenging, carburetion, fuel injection, super- and turbo-charging. Pre: ME 3124, ME 3404.

AOE 4234): Aerospace Propulsion Systems (3 credits) Fall only.

Design principles and performance analysis of atmospheric and space propulsion engines and systems. Application of thermodynamics, compressible fluid flow and combustion fundamentals to the design of gas turbine and rocket engines and components, including inlets, turbomachines, combustors, and nozzles. Matching of propulsion system to vehicle requirements. Pre: C- or better in ME 3404 and ME 3124 or AOE 3114 and AOE 3134.

ME/AOE 4244 – Marine Engineering (3 credits) Spring only.

Analysis of major ship propulsion devices (propellers, water jets). Integration with propulsion plant and machinery. Characteristics of marine steam turbines, nuclear power plants, marine diesels, and marine gas turbines. Shafting system, bearings, and vibration problems. Pre: C- or better in AOE 3204 and ME 3124 or ME 3134.

ESM 4304 – Hemodynamics (3 credits) Spring only.

Study of the human cardiovascular system and blood flow. Anatomy and physiology of the human heart, vascular system, and its organization. Blood physiology and rheology. Non-Newtonian blood flow models. Steady and pulsatile blood flow in rigid and elastic arteries. Pressure waves in elastic arteries. Three-dimensional blood flow in the aortic arch and flow around heart valves. Pre: ESM 3016 or ME 3404.