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

**Technical Electives:**

For students graduating before 2022, 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. For students graduating in 2022 or later, a limit of 3 credits of List #2 technical electives can be used to satisfy the 12 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.

*courses in grey have not been taught in at least one academic year and may not be available

**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) May be taught online.
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 3404/3414.

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, refrigeration cycles, etc.) to yield systems that provide heating, cooling, and ventilation. 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 and ME 3124 or ME 2134.

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


**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: ME 3404/3414 and ME 3124/2134 or AOE 3114 and AOE 3134.

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

Concepts, theory and methods for the design, integration, and assessment of naval and marine engineering systems considering energy conservation, ship arrangements, system deactivation diagrams, reliability, maintenance, system power, shock and weapons effects, machinery sizing, and system vulnerability. Physics-based mechanical, electrical, thermal, sensor, control, weapon systems, hullform and engine (diesel and gas turbine) models are used to predict total system performance. Linear programming methods and flow-based models are used to optimize systems architecture and size components. Pre: AOE 2054, AOE 2204, AOE 3264, AOE 4264. Course may be restricted to non-majors. Please see timetable notes for how to add.

**ESM 4304 – Hemodynamics (3 credits) Spring only.**