

Advanced MAE Courses*- Summer 2020 (not included in either AE or ME degree plans)

Instructor	Dept	Num	Sec	Days	Times	Title	Description
Dancila	MAE	4301	002	TR	5:00-6:50pm	Composite Structure: Manufacturing and Repair Prerequisite: Professional Standing	The course is intended to provide students with a clear and thorough understanding of common practices and principles for the manufacture and repair of composite structures. The class includes practical laboratories for composite panel fabrication, introduction of defects and/or damage, repair method demonstration, and strength evaluation.
Woods	MAE	4358	001	TR	6:00-7:50pm	Racecar Engineering Prerequisite: Must be in the professional ME, AE or EE program and C or better in each of the following - MAE 3360 (or MATH 3319) and MAE 2312 (or EE 3446)	This course intended for Formula SAE team members and other interested students to develop new systems or analyze concepts for the Formula SAE or Formula Electric racecar and related equipment. The students will form teams and perform research and development on projects related to automotive or racecar engineering.

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Staff	MAE	4301	001	MW	2:30-3:50pm	Powertrain Design & Analysis Prerequisite: Professional Standing	Powertrain is a crucial part of vehicle design. Engineers must master the complete powertrain design to meet different performance demands, such as acceleration, noise and vibrations, drivability, etc. This course is intended to develop an understanding of the principles behind the powertrain design and familiarize the students with different configurations. A systems approach is adopted to analyze the interaction of individual powertrain components and give a system-level view of powertrain so that the desired vehicle dynamic performance can be achieved. The students will also learn by solving the practical problems given as the examples in this course.
Shayesteh	MAE	4301	003	TR	11:00am - 12:20pm	Advanced Metal Additive Manufacturing Prerequisite: Professional Standing	This course is designed to provide an in depth understanding of the advantages as well as the limitations of AM technologies. This is open to graduate and undergraduate students.
Chudoba	MAE	4301	005	MWF	1:00-1:50pm	Future Spacecraft Propulsion Systems Prerequisite: Professional Standing	This course focuses on next generation spacecraft propulsion systems, from earth orbit launches to astronomical/Space exploration vehicles. The course aims at demonstrating the logical expansion of propulsion concepts while considering design constraints imposed by mission requirements.
Agonafer	MAE	4305	001	MW	7:00-8:20pm	Fundamentals of Electronic Packaging Prerequisites: Professional Standing, Heat Transfer, Material Science and Fluid Dynamics	An introductory treatment of electronic packaging from single chip to multichip, including materials, electrical design, thermal design, mechanical design, package modeling & simulation, processing considerations, reliability, and testing.
Woods	MAE	4312	001	TR	3:30-4:50pm	Control Systems Components Prerequisite: Professional Standing, C or better in MAE 4310	The components used in mechanical, electronic, and fluid power control systems are studied. Modeling and performance analysis are used to help in the understanding of system behavior.
Lawrence	MAE	4314	001	TR	12:30-1:50pm	Mechanical Vibrations Prerequisite: Professional Standing, C or better in each of the following - MAE 2312, MAE 2323, MAE 3360, & MATH 3330	Harmonic and periodic motion including both damped and undamped free and forced vibration. Single and multi-degree-of-freedom discrete systems. Vibration of continuous systems. Introduction of finite element method for structural dynamics.

*Courses subject to change. For current information, check course listing in MyMav.

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Beyle	MAE	4315	001	TR	2:00-3:20pm	Introduction to Composites Prerequisite: Professional Standing, C or better in MAE 2312	Composite classification, laminate coding, fiber and weight fractions of composite lamina; lamina constitutive equations; structural characteristics of [A], [B], [D] matrices; lamination theory; thermal and moisture induced load and moment; lamina stress analysis and failure prediction; issues in composite structural design.
Zhang	MAE	4325	001	TR	3:30-4:50pm	Combustion Prerequisite: Professional Standing, C or better in MAE 3310 (or 3309) and MAE 2315 (or 2314)	This course introduces the fundamentals and applications of combustion processes. Combustion systems are ubiquitous in present day engineering, and understanding the intimate coupling between chemical kinetics and fluid mechanics sub-processes leads to a more efficient design of energy harvesting devices.
Dennis	MAE	4326	001	MW	4:00-5:20pm	Computational Aerodynamics Prerequisite: Professional Standing	The computational fluids dynamics is a numerical tool that can be applied effectively to the analysis of many problems. This course is intended to provide a thorough introduction to the basic ideas employed in the derivation numerical techniques to fluid flow and heat transfer problems. The focus will be on methods of finite different methods such as finite volume will be introduced. Mastery of material provided in this course will enable intelligently use commercially available software and heat transfer analysis.
Taylor	MAE	4329	001	MWF	8:00-8:50am	Additive Manufacturing Prerequisites: Professional Standing, C or better in each of the following - MAE 1351 and MAE 3324	The range of technologies and processes, both physical and digital, used to translate virtual solid model data into physical models using additive layering methods. Emphasis is given to application of these technologies to manufacture end use components and assemblies but rapid prototyping is also discussed. Metal, polymer, ceramic, and composite material applications of AM are included. Discussion includes advantages and limitations of additive methods with respect to subtractive methods and to each other. Principles of design for additive manufacture are covered along with discussion of applications. Students complete a project to design and build an engineering component or assembly for additive manufacture.
Taylor	MAE	4331	001	MWF	10:00-10:50am	Design for Manufacturing Prerequisite: Professional Standing, C or better in each of the following -MAE 3242 and MAE 3344	The interaction between design and manufacturing stressed in terms of the design process, customer-focused quality, design specifications versus process capability and tolerances, and redesign for producibility. Topics include material and manufacturing process selection, tolerancing, quality function deployment (QFD), design for assembly (DFA), quality control techniques, reliability, and robust design.
Bowling	MAE	4345	001	TR	2:00-3:20pm	Introduction to Robotics Professional Standing, C or better in MAE 3318 (or EE 4314). For EE 4315: EE 4314 with C or better	Overview of industrial robots. Study of principles of kinematics, dynamics, and control as applied to industrial robotic systems; robotic sensors and actuators; path planning; programming of industrial robot in the laboratory; survey of robotic applications in various modern and traditional fields; and guidelines to robot arm design and selection. Offered as MAE 4345 and EE 4315. Credit will be granted in only one department.
Smith	MAE	4363	001	MWF	11:00-11:50am	Introduction to Rotorcraft Analysis Prerequisite: Professional Standing	Brief historical review of VSTOL concepts, the aerodynamics & dynamics of rotors, ducted fans, etc., Antitorque systems, performance, stability & control, Mechanics systems, fundamentals of helicopter operation & design, and evaluation of adv. Concepts.
Staff	MAE	4378	001	MW	4:00-5:20pm	Introduction to Unmanned Vehicle System Development Prerequisite: Admission to a professional engineering or science program.	Introduction to UVS (Unmanned Vehicle Systems) such as UAS (Unmanned Aircraft Systems), UGS (Unmanned Ground System) and UMS (Unmanned Maritime System), their history, missions, capabilities, types, configurations, subsystems, and the disciplines needed for UVS development and operation. UVS missions could include student competitions sponsored by various technical organizations. This course is team-taught by engineering faculty.
Dancila	MAE	4386	001	MW	11:00am - 12:20pm	Wind & Ocean Current Harvesting Prerequisite: Professional standing, C or better in EE 2320 & C or better in MAE 2314 or MAE 2315	A broad senior/graduate first course in wind/ocean current energy harvesting systems, focused on fundamentals, and serving as the basis for subsequent MAE specialized follow-on graduate course offerings focused on structures, aero/hydro-mechanical response & control.