<table>
<thead>
<tr>
<th>Instructor</th>
<th>Dept</th>
<th>Num</th>
<th>Sec</th>
<th>Days</th>
<th>Times</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mullins</td>
<td>MAE</td>
<td>4301</td>
<td>002</td>
<td>TR</td>
<td>2:00-3:20pm</td>
<td>Vertical Lift Aircraft Performance, Stability, Control, and Handling Qualities</td>
<td>Prerequisites: Professional Standing  Helicopter, tiltrotor and winged vertical lift aircraft general equations of motion, propeller and rotor forces and moments, stability and control characteristics, handling qualities, flight control system design considerations.</td>
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<tr>
<td>Beyle</td>
<td>MAE</td>
<td>4301</td>
<td>004</td>
<td>TR</td>
<td>2:00-3:20pm</td>
<td>Structural Aspects of Design</td>
<td>Prerequisites: Professional Standing, C or better in MAE 2312  This course provides analytical methods of structural analysis and failure theories that are used in design analysis. The course also provides analytical methods for fatigue life assessment.</td>
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<tr>
<td>Tong</td>
<td>MAE</td>
<td>4301</td>
<td>007</td>
<td>MW</td>
<td>1:00-2:20pm</td>
<td>Numerical Heat Transfer</td>
<td>Prerequisites: Professional Standing, C or better in MAE 4329  Discussion of numerical methods for conduction and convection heat transfer problems includes introduction to various computational techniques suitable for digital computers. Finite difference method is emphasized.</td>
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<tr>
<td>L. Wang</td>
<td>MAE</td>
<td>4301</td>
<td>010</td>
<td>MW</td>
<td>2:30-3:50pm</td>
<td>Probability &amp; Stochastic Processes</td>
<td>Prerequisite: Professional standing, C or better in MATH 3330  This class is intent to cover stochastic dynamic process, including Gaussian process, Poisson counters, and Markov chains, which has a great impact on real-world applications such as spiking neurons in neuroscience. It is also very useful in modeling and handling uncertainty in engineered systems including autonomous vehicles and robots, quantum mechanics, molecular dynamic simulation, and many others.</td>
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<tr>
<td>Agonafer</td>
<td>MAE</td>
<td>4306</td>
<td>001</td>
<td>MW</td>
<td>7:00-8:20pm</td>
<td>Computational Techniques for Electronic Packaging</td>
<td>Prerequisites: Professional Standing, C or better in MAE 3314 or MAE 3309  Characterization of the thermo/mechanical reliability of microelectronics devices using commercial computational heat transfer codes (Icepack, Flotherm, and ANSYS). Industry related problems ranging from first level packages through system level packages analyzed. Formulate and model contemporary problems using commercial CFD codes.</td>
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<tr>
<td>Staff</td>
<td>MAE</td>
<td>4314</td>
<td>001</td>
<td>TR</td>
<td>9:30-10:50am</td>
<td>Mechanical Vibrations</td>
<td>Prerequisite: Professional Standing, C or better in each of the following - MAE 2312, MAE 2323, MAE 3360, &amp; 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.</td>
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<tr>
<td>Staff</td>
<td>MAE</td>
<td>4322</td>
<td>001</td>
<td>TR</td>
<td>5:30-6:50pm</td>
<td>Rocket Propulsion</td>
<td>Prerequisite: Professional Standing, C or better in MAE 3303 (or 3311)  Examines chemical, nuclear, and electrical propulsion concepts. Development of design and performance analysis methods. Flight performance of rocket powered vehicles.</td>
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<tr>
<td>Taylor</td>
<td>MAE</td>
<td>4329</td>
<td>001</td>
<td>MWF</td>
<td>11:00-11:50am</td>
<td>Additive Manufacturing</td>
<td>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.</td>
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*Courses subject to change. For current information, check course listing in MyMav.*
## Advanced MAE Courses* - Spring 2020 (Continued)

### Title

#### Design for Manufacturing

- **Instructor:** Taylor
- **Dept:** MAE
- **Num:** 4331
- **Sec:** 001
- **Days:** MWF
- **Times:** 9:00-9:50am
- **Prerequisite:** Professional Standing, C or better in each of the following - MAE 3242 and MAE 3344

**Description:**

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.

#### Analytical & Computational Dynamics

- **Instructor:** Bowling
- **Dept:** MAE
- **Num:** 4335
- **Sec:** 001
- **Days:** TR
- **Times:** 3:30-4:50pm
- **Prerequisite:** Professional Standing, C or better in MAE 3318

**Description:**

The course focuses on developing the equations of motion for dynamic systems composed of multiple, connected and unconnected, rigid bodies using Kane's method and the Lagrangian approach. The resulting model is used to simulate and visualize the predicted motion. Topics include: kinematics, Euler parameters, kinematic constraints, virtual work, the calculus of variations, energy, momentum, contact, impact, and checking functions.

#### Automotive Engineering

- **Instructor:** Woods
- **Dept:** MAE
- **Num:** 4357
- **Sec:** 001
- **Days:** TR
- **Times:** 5:30-6:50pm
- **Prerequisite:** Professional Standing, C or better in each of the following – MAE 3360 (or MATH 3319), and MAE 2312 (or EE 3446)

**Description:**

Introduction to automotive engine types and performance, drive train modeling and vehicle loading characteristics, fueling requirements, fuel injection systems, tire characteristics and modeling, suspension characteristics and handling, braking systems and requirements. Course taught through lecture, student presentations and student design projects.

#### Introduction to Rotorcraft Analysis

- **Instructor:** Smith
- **Dept:** MAE
- **Num:** 4363
- **Sec:** 001
- **Days:** MWF
- **Times:** 10:00-10:50am
- **Prerequisite:** Professional Standing

**Description:**

History of rotorcraft. Behavior of the rotor blade in hover and forward flight. Rotor configurations, dynamic coupling with the fuselage, elastic and aeroelastic effects.

#### Unmanned Vehicle System Development

- **Instructor:** Staff
- **Dept:** MAE
- **Num:** 4379
- **Sec:** 001
- **Days:** M
- **Times:** 3:00-5:50pm
- **Prerequisite:** Professional standing, B or better in MAE 4378 and admission to the UVS certificate program

**Description:**

Introduction to the technologies needed to create an UVS (Unmanned Vehicle System). Integration of these technologies (embodied as a set of sensors, actuators, computing and mobility platform sub-systems) into a functioning UVS through team work. UVS could be designed to compete in a student competition sponsored by various technical organizations or to support a specific mission or function defined by the instructors. This course is team-taught by engineering faculty.

#### Energy Technology & Research Trends

- **Instructor:** Santhanagopalan
- **Dept:** MAE
- **Num:** 4382
- **Sec:** 001
- **Days:** MW
- **Times:** 2:30-3:50pm
- **Prerequisite:** Professional Standing

**Description:**

New energy technology is expected to be the growth point of our economy and job market, as well as a most powerful means to confront the global energy/environmental crisis. This area has experienced tremendous growth since the past several decades. It is now well positioned to be a focus of research and higher education.

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