

# Astronautics

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### Curriculum:

#### Core Courses

MAE 4060 – Introduction to Spaceflight Mechanics  
MAE 5160 – Spacecraft Technology and Systems Architecture

#### *Either or both of the following:*

MAE 6720 – Celestial Mechanics  
MAE 6060 – Spacecraft Attitude Dynamics, Estimation and Control (not offered 2019-20)

#### Specialization Courses

##### *Spacecraft Dynamics, Guidance, Navigation, and Control*

MAE 5150 - GPS: Theory and Design  
MAE 6969 - Seminar in GPS and GNSS (not offered 2019-20)  
MAE 5730 - Intermediate Dynamics  
MAE 5780 - Feedback Control Systems  
MAE 5790 - Nonlinear Dynamics and Chaos  
MAE 6700 - Advanced Dynamics  
MAE 6850 - Hamiltonian Dynamics (not offered 2019-20)  
MAE 6760 - Model-Based Estimation (not offered 2019-20)  
MAE 6770- Formal Methods for Robotics  
MAE 6780 - Multivariable Control Theory  
MAE 6810 - Methods of Applied Mathematics I  
MAE 6820 - Methods of Applied Mathematics II (not offered 2019-20)  
ECE 4110 - Random Signals in Communications and Signal Processing  
ECE 4250 - Digital Signal Processing  
ECE 5210 - Theory of Linear Systems  
ECE 5555 - Stochastic Systems: Estimation and Control (not offered 2019-20)

##### *Space robotics*

MAE 5180 - Autonomous Mobile Robots  
MAE 4758 - Robot Learning (not offered 2019-20)  
MAE 7770 - Mechanics of Terrestrial Locomotion (not offered 2019-20)  
ECE 4271 - Evolutionary Processes. Evolutionary Algorithms, Evolutionary Games  
ECE 5470 - Computer Vision

##### *Space Science*

AEP 4400 - Quantum and Nonlinear Optics  
AEP 6060 - Introduction to Plasma Physics  
ASTRO 4410 - Experimental Astronomy  
ASTRO 4431 -Physics of Stars, Neutron Stars and Black Holes  
ASTRO 4432 - Intersellar Medium and Galaxy Evolution  
ASTRO 4433 - Introduction to Cosmology  
ASTRO 6509 - General Relativity I (not offered 2019-20)  
ASTRO 6510 - General Relativity II (not offered 2019-20)  
ASTRO 6523 - Data Mining and Machine Learning in Astrophysics (not offered 2019-20)  
ASTRO 6560 - Theory of Stellar Structure and Evolution (not offered 2019-20)  
ASTRO 6570 - Physics of the Planets  
ASTRO 6577 - Planetary Surface Processes  
ASTRO 6590 - Galaxies and the Universe  
EAS 4260 - Structural Geology (not offered 2019-20)  
EAS 4530 – Mineralogy (not offered 2019-20)  
ECE 5810 - Introduction to Plasma Physics

##### *Space-Based Earth Observation*

CEE 4110 - Applied Remote Sensing and GIS for Resource Inventory and Analysis  
CEE 6100 - Remote Sensing Fundamentals  
EAS 4350 - Statistical Methods in Meteorology and Climatology (not offered 2019-20)  
EAS 4800 - Our Changing Atmosphere: Global Change and Atmospheric Chemistry (not offered 2018-19)  
EAS 4870 - Introduction to Radar Remote Sensing (not offered 2019-20)  
EAS 5011 - Evolution of the Earth System  
EAS 5840 - Inverse Methods in the Natural Sciences (not offered 2019-20)

*Space Travel, Exploration, Commercialization, and Settlement*

MAE 5910 - Model Based Systems Engineering  
MAE 5920 - Systems Architecture, Behavior, and Optimization  
MAE 5930 - Systems Engineering and Six Sigma for the Design and Operation of Reliable Systems  
MAE 6640 - Mechanics of Bone (not offered 2018-19)  
BME 4440 - Science Policy Bootcamp: Concept to Conclusion  
BME 5390 - Biomedical Materials and Devices for Human Body Repair  
MAE 6680 - Cancer for Engineers and Physicists  
ARCH 4621 - Sustainable Architecture: The Science and Politics of Green Building  
ARCH 5612 - Structural Concepts  
ARCH 5613 - Structural Systems  
ARCH 5611 - Environmental Systems I: Site and Sustainability  
ARCH 5616 - Environmental Systems II: Building Dynamics  
CEE 4510 - Microbiology for Environmental Engineering  
CEE 6910 - Principles of Project Leadership  
EAS 4790 – Paleobiology  
NBA 5070 - Entrepreneurship for Engineers and Scientists  
ORIE 5150 - Economic Analysis of Engineering Systems (not offered 2019-20)

*Advanced Technology*

MAE 4580 - Introduction to Nuclear Science and Engineering (not offered 2018-19)  
MAE 4590 - Introduction to Controlled Fusion: Principles and Technology  
MAE 4320 - MicroElectro Mechanical Systems (not offered 2018-19)  
MAE 5010 - Future Energy Systems  
ECE 4300 - Lasers and Optoelectronics  
BEE 4010 - Renewable Energy Systems  
CHEME 6662 - Solar Energy Module  
MSE 5862 - Introduction to Electronic Materials  
MSE 5310 - Introduction to Ceramics (not offered 2019-20)  
MSE 5850 - Electronic, Magnetic, and Dielectric Properties of Materials