- **Major in Aerospace Engineering**

  - **Master of Engineering (with creative component)** – A minimum of 27 credits of acceptable course work, at least 18 credits of which must be graduate course work in Aerospace Engineering along with a minimum of 3 credits of Aer E 599 (creative component) must be taken. The POS for this degree must include at least one course from each of the four following Aer E core areas.

  - **Master of Engineering (course work only option)** – A minimum of 30 credits of acceptable course work, at least 18 credits of which must be graduate course work in Aerospace Engineering must be taken. The POS for this degree must include at least one course from each of the four following Aer E core areas.

  - **Master of Science** – A minimum of 21 credits of acceptable course work, at least 15 credits of which must be graduate course work in Aerospace Engineering. In addition, a minimum of 9 credits in AerE 699 (thesis research) must be taken and an acceptable thesis is required. The POS for this degree must include at least one course from 3 of the 4 following Aer E core areas.

- **Aerospace Engineering Core Areas**
  - **Aircraft Structures**
    - Aer E 521 - Airframe Analysis
    - EM 525 - Finite Element Analysis
    - Aer E 569 - Mechanics of Composite and Combined Materials
    - EM 514 - Advanced Mechanics of Materials
  - **Astrodynamics and Flight Dynamics**
    - Aer E 551 - Orbital Mechanics
    - Aer E 577 - Linear Systems
    - Aer E 578 - Nonlinear Systems
    - EM 548 - Advanced Engineering Dynamics
  - **Incompressible/Compressible Aerodynamics**
    - Aer E 541 - Incompressible Flow Aerodynamics
    - Aer E 532 - Compressible Fluid Flow
    - Aer E 543 - Viscous Flow Aerodynamics
  - **Guidance, Navigation, and Control**
    - Aer E 556 - Guidance and Navigation of Aerospace Vehicles
    - Aer E 531 - Automatic Control of Flight Vehicles
    - Aer E 573 - Random Signals and Kalman Filtering
    - Aer E 574 - Optimal Control

- **Doctor of Philosophy** – The Graduate College requires a minimum of 72 credits for a Ph.D. degree. The department’s requirements include a minimum of 36 credits of acceptable course work, at least 24 credits of which must be graduate course work in Aerospace Engineering. You must also have a minimum of 9 credits of acceptable course work from outside the major. Courses related to the history, philosophy, sociology or political aspects of science and technology are strongly encouraged. Some course work at the 600 level is expected in all Ph.D. Programs of Study. The minimum of 36 credits of course work may include appropriate 590, 690 and experimental course credits. The POS for this degree must include one course from 3 of the
4 Aer E core areas listed above. The remainder of the POS is to be determined by the student and the POS committee.

- Each graduate student is required to present an open seminar as the first portion of the final thesis defense.

**Major in Engineering Mechanics**

- **Master of Engineering (with creative component)** – A minimum of 24 credits of acceptable course work, at least 18 credits of which must be graduate work in Engineering Mechanics, or a closely related specialty. In addition, a minimum of 3 credits of acceptable mathematics and 3 credits in E M 599 (creative component) must be taken. The POS for this degree must include at least one course from each of the following E M core areas.

- **Master of Engineering (course work only option)** – A minimum of 30 credits of acceptable course work, at least 18 credits of which must be graduate work in Engineering Mechanics, or a closely related specialty. In addition, a minimum of 3 credits of acceptable mathematics must be taken. The POS for this degree must include at least one course from each of the following E M core areas.

- **Master of Science** – A minimum of 18 credits of acceptable course work, at least 12 credits of which must be graduate work in Engineering Mechanics, or a closely related specialty. In addition, a minimum of 3 credits of acceptable mathematics and 9 credits in E M 699 (thesis research) must be taken. The POS for this degree must include at least one course from 3 of the 4 following E M core areas:

**Engineering Mechanics Core Areas**

- **Solid Mechanics/Mechanics of Materials**
  - E M 514 – Advanced Mechanics of Materials
  - E M 510 – Continuum Mechanics
  - E M 516 – Mechanics of Deformable Solids
  - E M 564 – Fracture and Fatigue

- **Fluid Mechanics/Aerodynamics**
  - Aer E 541 – Incompressible Flow Aerodynamics
  - Aer E 532 – Compressible Fluid Flow

- **Dynamics/Vibrations/ Wave Mechanics**
  - E M 548 – Advanced Engineering Dynamics
  - E M 518 – Waves in Elastic Solids with Applications to Ultrasonic NDE
  - E M 543 – Introduction to Random Vibrations and Nonlinear Dynamics

- **Computational Mechanics**
  - E M 525 – Finite Elements Analysis
  - Aer E 546 – Computational Fluid Dynamics
  - Math 561 and Math 562 – Numerical Analysis I and II

- **Doctor of Philosophy** – The Graduate College requires a minimum of 72 credits for a Ph.D. degree. The department’s requirements include a minimum of 36 credits of acceptable course work, at least 24 credits of which must be graduate work in Engineering Mechanics, or a closely related specialty. The Ph.D. candidate must complete 12 credits total of acceptable course work
from outside E M, at least 6 of these credits must be acceptable mathematics courses. Courses related to the history, philosophy, sociology or political aspects of science and technology are strongly encouraged. The course work may also include appropriate 590 or experimental course credits. In addition, a minimum of 36 credits in EM 699 (thesis research) must be taken. The POS for this degree must include one course from 3 of the 4 EM core areas listed above. The remainder of the POS is to be determined by the student and the POS committee.

- Each graduate student is required to present an open seminar as the first portion of the final thesis defense.

- **Preliminary Exam**

- For the Ph.D. degree in both Aerospace Engineering and in Engineering Mechanics, you must take a Preliminary Examination which is administered by your POS committee. This is an oral examination over your PhD research and related technical topics. A set of written materials which document your PhD research must be provided to your POS committee members at least one week prior to the oral examination. While the exact nature of the written materials given to your POS committee members is decided in consultation with your major professor, the written materials must consist of some combination of: i) an early draft dissertation or written overview of your research; ii) copies of technical publications; iii) a literature review; iv) a plan for completion of your PhD dissertation, as well as any other supporting materials. During the oral examination, the POS committee members may also ask you questions about technical topics and coursework related to your field of study. The individual POS committee members are given broad latitude in their selection of questions to be asked during the examination. The purpose of the preliminary examination is to assess your progress towards completion of your dissertation, evaluate your research and establish your depth of understanding of your field of study. The examination must be passed **no later than six months prior to your final exam** (dissertation defense). If you fail all or part of the preliminary oral examination, then you may retake the exam. Six months must elapse between the first attempt and the next.