

## MAE 166A

### Analysis of Aerospace Structures

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## COURSE CONTENT DESCRIPTION

- **Description of specific societal impact topics or ethics issues that are addressed in the course:**

This class focuses on analyzing and understanding the mechanical response of thin walled vessels such as those found in aircraft structures. The course includes constitutive relations, bending/extension of beams/plates, failure analysis, buckling calculations and aircraft design studies. The in service failure of any component in the aircraft can lead to a devastating failure with substantial loss of life. Therefore, the work conducted in this class has direct societal impact because the public continues to fear flying even though it remains one of the safest forms of transportation. This class both presents on how to ensure a safety factor is used in the design of these structures as well as the ramifications to our societal thinking if/when failures occur. The course also has several examples provided of well-known crashes and mistakes (e.g. unit mistake on a launch mission).

- **Time dedicated to cover this content through lecture and other in-class learning activities:**

During the last year, examples of recent crashes including moderate failures (e.g. window failure) have been presented throughout the course lectures. Specifically, all the work done in this class during the quarter contributes to the failure analysis which are more directly related to events during the last few weeks. Regardless, the instructor emphasizes these relationships throughout the entire course. More emphasis is given on this topic during the first class lecture to motivate the students so they understand the importance of the topic covered during this quarter long class. The emphasis on the impact failure has on our societal body is briefly covered throughout the quarter with substantially more time paid during the fatigue and failure based sections of the course.

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## OUTCOMES

- Aligned with ABET Student Outcome Criteria #4:

**Outcome 1:** Students learn the importance of stress strain calculations as they relate to failure and the impact even one aircraft crash has on our societal perspective of air travel.

**Outcome 2:** Students learn the importance of their attention to detail including units which have caused catastrophic failures in the past.