

## Thermal Protection Systems for Space Applications: Expected Course Outline

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*This course will include a background on the use of ceramics in spacecraft thermal protection systems (TPS), an overview of currently used materials and manufacturing methods, and approaches to characterize and test materials. Specific case studies will also be presented, including the use of ceramic matrix composites (CMCs), TPS flight certification, Shuttle TPS lessons learned, and developing HEEET from the lab-scale to a Technology Readiness Level (TRL) of 6.*

*High enthalpy and thermos-structural testing will also be covered to provide examples of high temperature testing relevant to the problem of atmospheric re-entry. The course is designed for technical people who would like to learn more about how ceramics are used to protect spacecraft from the extreme heat of atmospheric re-entry. Attendees will understand the need for ceramic TPS for spaceflight, learn the fundamentals underpinning material design, manufacturing, and testing, and discover future challenges in the field.*

<u>Topics / Activities During Class</u>	<u>Topic Instructor</u>
Intro to Ceramics for TPS	Nate Olson
Materials for Reusable TPS	Jay Feldman
Manufacturing Reusable TPS: Tiles & Blankets	Tim Wright
Ceramic Matrix Composites	David Glass
TPS Flight Certification & NASA TPS Standard	Stan Bouslog
Shuttle TPS Lessons Learned	John Kowal or Cooper Snapp
High Enthalpy Testing	Adam Sidor
Thermo-Structural Testing	Craig Stephens
Materials Characterization for Reusable TPS	Vishnu Oruganti & Jay Feldman
Future Challenges in Ceramics for TPS	Nate Olson
Developing Material to TRL 6: HEEET	Don Ellerby