TEXAS SPACE GRANT CONSORTIUM
DESIGN CHALLENGE

TOPIC # - TDC - 210

NASA PSYCHE: Sample Return from Hypothesized Surfaces

BACKGROUND

The NASA Psyche mission is an orbiter mission to the metal-rich asteroid, Psyche, in the asteroid belt between Mars and Jupiter. The spacecraft, which launched in October 2023 and will arrive at the asteroid in mid-2029, will study the asteroid from orbit for the first time and will not land on the surface.

Designing to the range of hypothesized surfaces and terrain that might be found at Psyche, which have been laid out in recent scientific reports (and keeping in mind other constraints such as its gravity), you will design a system that could take cached samples and return them to Earth. This might involve delivering the cached samples to another spacecraft in orbit around Psyche or putting them in a vehicle that could make its way directly back to Earth or another solution of your choosing that aligns with your training to date. Your team will have to keep in mind the need to design a transport system that would preserve the integrity of the samples coming from the range of hypothesized surface materials of Psyche. Hypothesized surfaces and terrain may include: mostly flat metallic surface, flat metallic with metal and/or rocky debris, rough/high-relief metallic and/or rocky terrain, high-relief metallic crater walls. The project deliverables can include, for example, calculations, simulations, design packages, or, if time and resources in your course allow, physical prototyping.

NASA PSYCHE

The Psyche mission is developing Psyche-focused projects for capstone courses across a range of disciplines. Note: to participate in the PSYCHE topics, teams should be part of a capstone class.

See NASA PSYCHE for additional program information.

DESIGN TEAM PROFILE

NASA MENTOR:	Cassie Bowman
LEVEL:	Undergraduate students of any level
MAJOR/DISCIPLINE:	All relevant majors welcome
TEAMS:	Teams should be capstone classes.
DURATION:	1 or two semesters