



TOPIC # - TDC - 205

NASA PSYCHE: Instrumentation for High-Priority Science on 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.

In this capstone project, you are in the role of the mission formulation team tasked with identifying what instruments (on a lander or rover) would be needed to accomplish one or more of these science observations, focusing on things that can only be measured in contact or close vicinity with the surface. A wide variety of methods have already been applied to other planetary bodies that can serve as background for your work, such as different types of spectroscopy, imaging, temperature, magnetic, seismometer, or other sensors, and other physical systems such as trenchers, drills, rasps. Using Psyche's known and hypothesized environmental and surface conditions, which have been laid out in recent scientific reports, and keeping in mind other constraints such as its gravity, length of day and year, rotation, surface temperature, you will identify an optimal instrument suite, determine the mass and power requirements, and address other constraints such as placement of the instruments on the lander/rover for maximum safety as well as science return. 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

