AND TO THINK, I TRAVELLED TWENTY THOUSAND LIGHT YEARS JUST TO BE EMBARRASSED BY YOU.
Simple facts:

The Universe is vast.

The Universe is old.

The elements for life are wide-spread.

Our physical laws appear universal.

The Universe is mostly empty!
Themes in Our Solar System

Temperature Trends
Energy for Life

Rocky, Gassy, Icy
Atmospheres
Moons
Stability
Special Conditions
Winning the Lottery
The History of the Earth

Earth’s formation and bombardment
Formation of Moon and late heavy bombardment
Continental Motion
The Early Earth’s Atmosphere
Life’s interaction with the Atmosphere

What is important to life!
The Dawn of Life on Earth

The Earth today – abundant life
Fossil History – the evolution to today
Tree of Life
Lessons from history and evolution
Habitability and Climate Change

Defining Habitability
Requirements for Habitability
Regulating mechanisms for Climate
The role of impact
The role of greenhouse gases
What might it take to have intelligent life?
Defining Life

What is life?

Key Properties of Biological Life

The boundary between chemical reaction and life

Can there be robotic life?

What about virtual life?
ASTR 380
Traditional Life

Metabolism – chemical reactions that maintain life
Adenosine triphosphate APT cycle
Biological Evolution: random variations and
natural selection
Diversity though interaction with environment
What types of extreme organisms exist? What makes them special? How do they fit into the tree of life? How do they exist in so many places? What can we learn from them?
The Origins of Life on Earth

Working back from today
The most basic components
How DNA and RNA work
Working forward from simple molecules
Bridging the gap

I hope to convince you that life cannot possibly exist!
Mass Extinctions and the threat of Asteroid/Comet Impacts

Major mass extinctions in the past
Volcanoes as causes of mass extinctions
Impact craters and extinctions
The role of mass extinctions in evolution
Test Preparation

Overall:
• Work on the concepts and ideas, be able to explain them and give an example.
• Understand how processes interact to affect life: Greenhouse effect, impacts, natural selection, Habitability
• Think about your opinion on the major issues raised in class and be able to express and defend your opinion

Details:
all of the names and details presented in class are examples and context – not to be memorized

Your answers should show knowledge of what has been discussed in class.