

Cosmic Connections:

An Introduction to Astronomy and Maine's Magnificent Night Skies

Instructor: Russell F. Pinizzotto, Ph.D. (Russ)

Tuesday, 9:30 am to 11:30 am, 03 February 2026 to 24 March 2026

<https://maine.zoom.us/j/84333945421?pwd=EhJZLLA50n5jOwhppe37V6TOynw2Rc.1>

<https://midcoastseniorcollege.org/project/intro-to-astronomy-course-website/>

Unit 1 — Welcome and Orientation to Maine's Magnificent Night Skies

0:00–0:05 – Welcome and Introductions

0:05–0:15 – Course Materials

0:15–0:25 – The Planisphere

0:25–0:40 – SkySafari 8 Basic

0:40–1:00 – Constellations and Stars You Should Get to Know

Moché References:

- *Introduction: Cosmic View*
 - *Chapter 1: Understanding The Starry Sky*
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Optional Homework: Use SkySafari to find Polaris and Orion.

Unit 2 — Understanding Motion and the Celestial Sphere

0:00–0:10 – Find cardinal directions (apps, maps)

- Google Earth
- maps.google.com

0:10–0:15 – Rotation and Revolution

0:15–0:20 – The Solar Day and the Sidereal Day

0:20–0:30 – The Celestial Sphere

0:30–0:40 – Earth's rotation the 4 minute difference

0:40–0:50 – Annual Motion and the Zodiac

0:50–1:00 – Star Distances: The 3D Illusion

Moché References:

- *Chapter 1: Understanding The Starry Sky*
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Optional Homework: observe the night sky!

Unit 3 — Seasons and the Tilted Earth

0:00–0:05 – The Earth’s Axis and Its Stability
0:05–0:15 – Tilt, not distance
0:15–0:30 – The Physics of Sunlight
0:30–0:40 – The Motion of Sun During Maine’s Seasons
0:40–0:50 – Solstices and Equinoxes
0:50–1:00 – The Ocean’s Role: Thermal Lag

Moché References:

- *Chapter 1: Understanding The Starry Sky*
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Optional Homework: Observe the position of sunrise or sunset over several weeks.

Unit 4 — The Moon: Phases and Patterns

0:00–0:10 – Maria and Highlands
0:10–0:15 – Tidal Locking
0:15–0:35 – The Lunar Cycle: The Geometry of Light
0:35–0:40 – The Far Side of Moon
0:40–0:55 – Human Exploration of Moon
0:55–1:00 – The Moon Illusion

Moché References:

- *Chapter 10: The Moon*
 - Diagrams: waxing/waning, geometry of phases
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Optional Homework: observe the Moon!

Unit 5 — Tides and Eclipses

0:00–0:05 – The Dance of Three Bodies (Sun, Earth, Moon)
0:05–0:25 – Tides: The Ocean’s Pulse
0:25–0:45 – Eclipses: The Perfect Alignment
0:45–0:55 – Why They Don’t Happen Every Month
0:50–1:00 – Future Events and Safety

Moché References:

- *Chapter 10: The Moon*
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Optional Homework: observe the tides!

Unit 6 — The Inner Circle

0:00–0:05 – The Terrestrial Neighborhood
0:05–0:15 – Mercury: The Scorched Speedster
0:15–0:25 – Venus: Earth’s Evil Twin
0:35–0:45 – Earth: The Goldilocks Zone
0:45–0:55 – Mars: The Rusty Frontier
0:55–1:00 – Comparisons

Moché References:

- *Chapter 8: Exploring The Solar System*
 - *Chapter 9: The Planets*
 - Sections on Mercury, Venus, Earth, and Mars
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Optional Homework: Which terrestrial planets are visible tonight?

Unit 7 — The Gas and Ice Giants

0:00–0:05 – Beyond the Asteroid Belt
0:05–0:20 – Jupiter: The King of Planets
0:20–0:35 – Saturn: The Jewel of the Solar System
0:35–0:45 – Uranus: The Tilted Ice Giant
0:45–0:55 – Neptune: The Windy Frontier
0:55–1:00 – Comparisons

Moché References:

- *Chapter 9: The Planets*
 - Sections on Jupiter, Saturn, Uranus, Neptune
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Optional Homework: Which Gas and Ice Giants are visible tonight, either unaided eye or with binoculars?

Unit 8 — Dwarf Planets, Asteroids, Comets, Meteoroids: Wanderers of the Dark

0:00–0:05 – The Solar System’s Leftovers

0:10–0:25 – Dwarf Planets: The “Almost” Worlds

0:25–0:35 – Asteroids: The Rocky Remnants

0:34–0:43 – Comets: Dirty Snowballs and Interstellar Guests

0:43–0:52 – Asteroids: The Rocky Remnants

0:52–1:00 – Meteoroids, Meteors, and Meteorites

Moché References:

- *Chapter 9: The Planets*
 - Section on Dwarf Planets
- *Chapter 11: Comets, Meteors, and Meteorites*
 - Comet structure diagrams (coma, tail, nucleus)

Optional Homework: Find the location of a comet visible this week using Sky Safari.

Unit 9 — Our Sun: The Living Star

0:00–0:05 – The Ordinary Miracle

0:05–0:20 – Anatomy of a Star: The Layer Cake

0:20–0:32 – The Atmosphere and the Solar Wind

0:32–0:47 – Magnetic Temperament: Sunspots and Flares

0:47–0:55 – The Sun’s Life Story: Past and Future

0:55–1:00 – Solar Safety

Moché References:

- *Chapter 4: The Sun*
 - Solar cycle figures

Optional Homework: Visit gong.nso.edu. Does Sun have any sunspots today?

Unit 10 — The Life and Death of Stars

0:00–0:10 – The Stellar Nursery
0:10–0:25 – The Main Sequence: The Long Middle Age
0:25–0:35 – The Beginning of the End: Expansion
0:35–0:50 – The Great Finale: Two Paths
0:50–1:00 – We Are Star Stuff!

Moché References:

- *Chapter 3: The Stars*
 - *Chapter 5: Stellar Evolution*
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Optional Homework: Identify the Winter Hexagon and note the difference in the colors of the stars.

Unit 11 — Exoplanets

0:00–0:10 – Introduction
0:10–0:25 – How do we find them?
0:25–0:40 – A Tour of Exotic Worlds
0:40–0:60 – The Goldilocks Zone and the Search for Life

Moché References:

- *Chapter 12: Life On Other Worlds?*
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Optional Homework: Use SkySafari to observe a star other than Sun known to have a planet.

Unit 12 — The Milky Way: Our Cosmic Metropolis

0:00–0:10 – The Big Picture: What Is the Milky Way?
0:10–0:22 – You Are Here: Our Galactic Address
0:22–0:37 – The Heart of the Beast: Sagittarius A*
0:37–0:50 – The Hidden Galaxy: Dark Matter and The Halo
0:50–1:00 – The Future: The Great Galactic Collision!

Moché References:

- *Chapter 6: Galaxies*
 - Disk/bulge/halo structure, star clusters
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Optional Homework: Observe the Milky Way with the unaided eye or binoculars.

Unit 13 — Galaxies: The Islands of the Universe

0:00–0:10 – Beyond the Milky Way: The Great Debate

0:10–0:25 – The Hubble Tuning Fork: Classifying Galaxies

0:25–0:37 – Active Galaxies and Quasars: The Engines of Light

0:37–0:50 – The Large Scale Structure: Cosmic Filaments

0:50–1:00 – Galactic Evolution: A Story of Mergers

Moché References:

- *Chapter 6: Galaxies*
- Hubble tuning fork, galaxy evolution

Optional Homework: Find M31, the Andromeda Galaxy with the unaided eye or binoculars.

Unit 14 — Cosmology: The Beginning and End of Everything

0:00–0:15 – The Big Bang: Not an Explosion, but an Expansion

0:15–0:27 – Dark Matter: The Invisible Glue

0:27–0:42 – Dark Energy: The “Anti-Gravity”

0:42–0:50 – The Geometry of Space

0:50–1:00 – The Three Fates: How It Ends

Moché References:

- *Chapter 7: The Universe*
 - Expansion diagrams, balloon analogy, dark matter evidence

Optional Homework: Read an article about the cosmology of the Wabanaki.

Unit 15 — Practical Stargazing and Course Wrap-Up

0:00–0:15 – the Toolkit: Binoculars and Telescopes

0:15–0:25 – Apps and Maps

- Planetarium Apps
- Weather and Light Pollution
- Planisphere

0:25–0:37 – Tonight’s Target List

0:37–0:52 – Course Wrap-Up: The Big Picture

0:52–1:00 – Closing Ceremony

Moché References:

- *Chapter 1: Understanding the Starry Sky*
- *Chapter 2: Light and Telescopes*
- *Appendices: sky charts & observing tips*

Optional Homework: Enjoy Maine’s Magnificent Night Skies!
