Everything YOU wanted to know about Teaching High School Astronomy

MARY KAY HEMENWAY
NATASCHA COX
KEELY FINKELESTEIN
JODY HARKRIDER
KAREN GREEN
DELIA POSEY

This presentation is supported by McDonald Observatory the University of Texas at Austin.
Limited Lab Space?

- Most astronomy labs don’t need:
  - Water
  - Chemistry hoods
  - Extensive use of computers
- Most astronomy labs do need:
  - Table space
  - Normal access to electrical outlets
  - Occasional: a way to darken the room
  - Projection system (for those wonderful visuals)
Equipment

- You may already have some equipment for astronomy in your physics or chemistry supplies
  - Lenses
  - Mirrors
  - Rulers/meter sticks
  - Gas emission tubes/diffraction gratings
Equipment

- New supplies
  - Polystyrene spheres (for phases)
  - Solar motion demonstrators (for seasons)
  - Celestial sphere with horizon ring (one for demonstration)

- Very few consumables are needed, and are often common supplies
  - Play-doh
  - Foam-core boards
  - String
  - Elastic/safety pins
Do I need a telescope?

- Probably, yes. But, you don’t need one for each student.
- Dr. Hemenway’s recommendation:
  - One larger telescope for special star parties
    - Estimated cost for 8-inch “go-to” scope = $1500
    - Estimated cost for 8-inch Dobsonian = $300-400
    - Estimated cost for 4-inch Astroscan = $200
  - Several smaller telescopes and/or binoculars
    - Galileoscope = $25 (if you purchase six or more)
    - Binoculars = $35
    - Tripod = $22
But, I can’t meet at night

- At least once a semester – try for a star-party at night (perhaps after a school open house or parent meeting). Invite a local astronomy club to bring telescopes and use yours.

- Use your telescopes during the day to view:
  - Sun (with appropriate safety cautions) or specialized telescope
  - Moon
  - Venus

- Option: Use a remote telescope
OK, I want one. How do I choose a telescope?

- Picking a telescope is like picking out a new car. Consider your potential needs and price range.
- Hints are at:
  http://stardate.org/nightsky/bguide/view

Aperture (diameter of lens or mirror) determines light-gathering power

- Eyepieces determine magnification (get at least two)
- Use electricity or not.
- Where will you store it and how heavy is it to move?
Remote Telescopes

**Advantages:**
- Often larger aperture
- Often backed by professional staff
- Some daytime access
- Some “observations by order”
- Can involve students in real research
- Processes images that are a permanent record

**Disadvantages:**
- Require good computer access
- Require more training for operation
- Require computers to process the data (images)
### A sample HS course scope and anchors
#### Kelley Janes

<table>
<thead>
<tr>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale of the universe</td>
<td>Scale of the universe</td>
<td>Interpreting light</td>
<td>Galaxies</td>
</tr>
<tr>
<td>Motion of the sky</td>
<td>Motion of the sky</td>
<td>Electromagnetic spectrum</td>
<td>Roots of astronomy project</td>
</tr>
<tr>
<td>Modeling the night sky</td>
<td>Model of the night sky</td>
<td>Stellar evolution</td>
<td>The telescope</td>
</tr>
<tr>
<td>Equatorial sundials</td>
<td>Equatorial sundials</td>
<td>Lives of stars</td>
<td>The telescope</td>
</tr>
<tr>
<td>Comparative solar system project</td>
<td>Comparative solar system project</td>
<td>Observation project</td>
<td>Student choice poster project</td>
</tr>
<tr>
<td>Earth moon system</td>
<td>Earth moon system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- SCALE MODELS
- ELLIPTICAL ORBITS
- STARS AND GALAXIES
- THE EVIDENCE IS CLEAR
Website

http://outreach.as.utexas.edu/marykay/highschool/hs.html
Other Resources

- Classroom Activities and Resources:
  - Activities done in this WS, along with many others can be found at:

- Student Field Trips – Virtual or Onsite Visits:
  - Virtual Tours of the Observatory as part of “Live...from McDonald Observatory” Program with live in classroom video-conferencing
  - Onsite Field Trips – with hands-on inquiry based activities, and tours of the Observatory
  - [http://mcdonaldobservatory.org/teachers/visit/](http://mcdonaldobservatory.org/teachers/visit/)
Teacher/Student Resources and Programs

HTTP://MCDONALDOBSERVATORY.ORG/LEARN/
Teacher Professional Development Workshops:

Apply Online at:
http://mcdonaldobservatory.org/teachers/profdev/
## Summer 2013 Workshops:

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Earth and Space Science</strong></td>
<td>June 17 – 19</td>
<td>9-12</td>
</tr>
<tr>
<td><strong>Solar Systems Uncovered</strong></td>
<td>June 20 – 22</td>
<td>6-12</td>
</tr>
<tr>
<td><strong>Explore Our Solar System</strong></td>
<td>July 8 – 10</td>
<td>K-8</td>
</tr>
<tr>
<td><strong>Stellar Explosions!</strong></td>
<td>July 17 – 19</td>
<td>8-12</td>
</tr>
</tbody>
</table>

* This WS is funded by NASA – covers lodging, meals, and program fees. Other programs listed are $600, although pending funding for others may become available, TBD.

** Deadline to apply is February 8, 2013:
http://mcdonaldobservatory.org/teachers/profdev/
Other Resources at McDonald Observatory:

- Classroom Activities and Resources:
  - Activities done in this WS, along with many others can be found at:

- Student Field Trips – Virtual or Onsite Visits:
  - Interactive videoconference experiences for your classroom as part of “Live...from McDonald Observatory” Program with real-time telescope observations.
  - Onsite Field Trips – with hands-on inquiry based activities, and tours of the Observatory.
  - [http://mcdonaldobservatory.org/teachers/visit/](http://mcdonaldobservatory.org/teachers/visit/)
Other Teacher Resources:

- **Project Share website** – Partners are the TEA, New York Times Knowledge Network, and PBS
- **McDonald Observatory/StarDate** is a contributor
  - Good resource for students wanting to do research, more vetted than wikipedia, google searches, etc.
  - Professional learning communities for educators to collaborate and participate in online opportunities
  - [http://projectsharetexas.org/](http://projectsharetexas.org/)
  - Contact your district IT rep or education service center to get an account