
www.du.edu/~rstencel/phys2060.html

4 Quarter Hours – can be applied to Physics or Astronomy Minor
Pre-/co-requisites: PHYS 1050+, 1111+ and 1211+ or instructor's permission.

Class: Tu+Th 1:00-2:45pm @ Marlar, 313 SpaceSciLab [PhysAstron], & some evenings
Prof. Robert E. “Dr. Bob” Stencel, William Herschel Womble Professor of Astronomy,
Director of Chamberlin & Mt.Evans Observatories
Dept. Physics & Astronomy, 409SSL, 303-871-2135, rstencel@du.edu
Office hours before/after class

Course description: The student will develop and refine facility and experience with
telemoscopes, software, methods, catalogs, libraries, astronomical instrumentation and
assorted contents of the universe, including ground-based and space-based telescopes and
detector systems. Observing projects include using internet telescope(s), the DU Student
Astronomy Lab [SAL], the 20 inch Clark/Saegmuller refractor at DU’s historic
Chamberlin Observatory and/or Mt.Evans reflectors/data for observing, measuring and
practicing public instruction. Math tools include: algebra, statistics, calculus, Excel,
SciNotebook, Mathcad, IDL, C++, etc. Actual content varies. Literature based updates
to theory as available.

TEXTBOOKS:
ISBN 978-0-521-85370-5 [used in both quarters, Phys2061 & 2062]
Plus your LAPTOP, software to be provided & your observing notebook required.

References [and many more exist at Penrose Library around QB145]:
H. Bradt. Astronomy Methods, 2004 Cambridge; S. Howell, Handbook of CCD Astronomy,
2000 Cambridge press; C. Kitchin, Telescopes and Techniques, 1995 Springer; J. Meeus,
Astronomical Formulae for Calculators, 4ed, 1988, Willmann-Bell; Practical Universe

Field trip options: S&S Optika, Littleton; Equinox Labs, Lakewood & Pinecliffe;
Software Bisque, Golden; JMI Industries, Lakewood, and others.

Some websites of note: www.du.edu/~rstencel; www.calsky.com; Concam.net;
Shareyoursky.com; google Sky, etc.

Student evaluation: Grading based on combination of attendance, participation, problem
sets, labs, quizzes and final exam. Breakpoints A-/B+ @90%, B-/C+ @80%, C-/D+
@70% etc. DU’s honor code is in effect, see website www.du.edu/honorcode. Grading
policy posted at webpage: http://mysite.du.edu/~rstencel/Courses/grading.htm - including
late paper policy. Cell phones OFF during class, please. Thanks.
<table>
<thead>
<tr>
<th>Week</th>
<th>In Class</th>
<th>Readings</th>
<th>Homework, etc**</th>
<th>Observing***</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan.3, 5</td>
<td>Introduction, software tutorials</td>
<td>Due Jan.10 – p.17 Starwheel &amp; software practice.</td>
<td>Internet telescopes TzecMaun: 1 hour per week minimum</td>
</tr>
<tr>
<td>2</td>
<td>Jan.10, 12</td>
<td>Coordinate systems; Time</td>
<td>Due Jan.17 – p.33 Meeus texts</td>
<td>Start visual variable star project - “Ten stars” → Portfolio updates</td>
</tr>
<tr>
<td>3</td>
<td>Jan.17, 19</td>
<td>Charts &amp; catalogs</td>
<td>Due Jan.24 – p.54 Birney ch.3</td>
<td>Start Moonwatch 1</td>
</tr>
<tr>
<td>4</td>
<td>Jan.24, 26</td>
<td>Spherical Trig</td>
<td>Due Jan.31 – p.80 Birney ch.4</td>
<td>Chamberlin night-Fri.27th, 8pm</td>
</tr>
<tr>
<td>5</td>
<td>Jan.31, 2/2*</td>
<td>Light</td>
<td>Due Feb.7 – p.99 Quiz 1</td>
<td>*quarter cross day</td>
</tr>
<tr>
<td>6</td>
<td>Feb.7, 9</td>
<td>Telescopes &amp; observatories</td>
<td>Due Feb.14, p.123-4 Birney ch.6</td>
<td>Moonwatch1 due [Feb.10th]</td>
</tr>
<tr>
<td>7</td>
<td>Feb.14, 16</td>
<td>The atmosphere</td>
<td>DueFeb.21, p.143-4 Birney ch.7</td>
<td>Start observatory design project</td>
</tr>
<tr>
<td>8</td>
<td>Feb.21, 23</td>
<td>Detectors</td>
<td>Due Mar.3 – p.168 Birney ch.8</td>
<td>Start Moonwatch2;</td>
</tr>
<tr>
<td>9</td>
<td>Feb.28, 3/1 (Leap Day)</td>
<td>CCD image processing, measuring</td>
<td>DueMar.10, p.181-2 Quiz 2</td>
<td>Chamberlin night-Fri.2nd, 8pm</td>
</tr>
<tr>
<td>10</td>
<td>Mar.6, 8</td>
<td>Last class: intro photometry</td>
<td>--</td>
<td>Obs.design due</td>
</tr>
<tr>
<td>13</td>
<td>Mar.13</td>
<td>Final</td>
<td>--</td>
<td>Have a fun Spring Break!</td>
</tr>
</tbody>
</table>

*Software set includes SKY, CCDSOFT, EXCEL, MATHCAD, Find_Orb, others

**Observing modules [choose two]: planetary satellites; asteroid light curves; variable stars; comet tracking; supernova search; light pollution assessment; astrometry; orbit determination; calibration tasks; data reduction/archiving; astro-biz, other… ***Access: my numeric pager is 303-767-1392

Projects: Observatory design, orbits, remote observing, etc.

Report format: Theory; Observing plan; Logbook; Analysis; Results & Future

SAL = Student Astronomy Lab, room 422 & roof Space Sci Lab [Phys]

Chamb = DU’s historic Chamberlin Observatory, 2930 E. Warren Ave.

Meeus supplemental: *Julian Day and Calendar Date *Ephemeris Time and Universal Time

*Geocentric Rectangular Coordinates of an Observer *Sidereal Time at Greenwich

*Transformation of Coordinates *Angular Separation *Precession; Nutation *Apparent Place of a Star *Reduction of Ecliptical Elements From One Equinox to Another *Solar Coordinates

*Rectangular Coordinates of the Sun *Equinoxes and Solstices *Equation of Time *Equation of Kepler *Elements of the Planetary Orbits *Semidiameters of Sun, Moon and Planets *Stellar Magnitudes

Obs. Design source materials: www.homedome.com
Notes on Tzec Maun internet telescope usage:

Sign-Up Link =  http://portal.tzecmaun.org/student/signup.php
then select University of Denver and use this password to access the sign-up page: pioneer

Note helpful webtools to get you started:
Video Tutorials
-- get familiar with telescope use here:

Telescope Portal
--When you are ready to image, go to the Telescope Portal:
http://portal.tzecmaun.org/portal/