PHYS 2061 – Telescopes & Instruments [Astronomical Methods I] – **DU, Jan. 2012**
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.
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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 telescopes, 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:
[1] Observational Astronomy, by Birney, et al., 2006, Cambridge Press, 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 (workbook) by Cuntz et al. 2008 Kendall-Hunt, ISBN 978-0-7575-4633-4

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.

Preliminary Schedule, PHYS2061: Telescopes & Instruments, DU Astronomy Winter 2012
*Schedule subject to change depending on class dynamics   Vers. 12/17/2011

2012	In Class	Readings	Homework, etc**	Observing***
Week 1 Jan.3, 5	Introduction, software tutorials	Birney ch.1	Due Jan.10 – p.17 Starwheel & software practice.	Internet telescopes TzecMaun: 1 hour per week minimum
Week 2 Jan.10, 12	Coordinate systems; Time	Birney ch.2 Meeus texts	Due Jan.17 – p.33	Start visual variable star project - "Ten stars" → *Portfolio updates*
Week 3 Jan.17, 19	Charts & catalogs	Birney ch.3	Due Jan.24 – p.54	*Start Moonwatch 1*
Week 4 Jan.24, 26	Spherical Trig	Birney ch.4	Due Jan.31 – p.80	*Chamberlin night- Fri.27th, 8pm*
Week 5 1/31, 2/2*	Light	Birney ch.5	Due Feb.7 – p.99 Quiz 1	*quarter cross day
Week 6 Feb.7, 9	Telescopes & observatories	Birney ch.6	Due Feb.14, p.123-4	Moonwatch1 due [Feb.10th]
Week 7 Feb.14, 16	The atmosphere	Birney ch.7	DueFeb.21, p.143-4	Start observatory design project
Week 8 Feb.21, 23	Detectors	Birney ch.8	Due Mar.3 – p.168	Start Moonwatch2;
Week 9 2/28, 3/1 *(Leap Day)*	CCD image processing, measuring	Birney ch.9	DueMar.10, p.181-2 Quiz 2	*Chamberlin night- Fri.2nd, 8pm* Obs.design due
Week 10 Mar.6, 8	Last class: intro photometry	Birney ch10	--	Moonwatch2 due Mar.8th
Mar.13	Final	--	--	*Have a fun Spring Break!*

*Software set includes SKY, CCDSOFT, EXCEL, MATHCAD, Find_Orb, others
<u>Observing modules</u> [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…   *<u>**Access: my numeric pager is 303-767-1392**</u>

<u>Projects:</u> Observatory design, orbits, remote observing, etc.

<u>Report format</u>: 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.

<u>Meeus supplemental</u>: *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
<u>Obs. Design</u> 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:
http://portal.tzecmaun.org/video/index.php

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