SYLLABUS

Course Information

PHYS 328L — Astronomy Laboratory II — Spring 2018, Location: Workman 310
Time: Monday 17:00-17:50 (but most work will be done outside of lecture — often at night including at Etscorn Observatory)

Professor: Dr. David Meier, Workman 359
Tel: 835-5340, email: david.meier@nmt.edu (preferred),
Office Hours: M: 14:00 - 16:00; W: 11:00 - 12:00; or by appointment

Teaching Associate: James Price, Workman 318
email: james.price@student.nmt.edu,
Office Hours: ThF: 14:00 - 16:00

Class Webpage: kestrel.nmt.edu/~dmeier/phys328L/phys328L.html

Learning Outcomes:

Program Learning Outcomes: Program mission / learning outcomes are available at the top of the main NMT physics webpage. This is an undergraduate major / astrophysics option required course. In the short-term, we prepare students for work on their next milestones: for undergraduate majors this means graduate study or employment. In the longer term, the Physics department prepares all students for careers in workplaces with continually changing needs and technologies.

Course Learning Outcomes: By the end of class it is expected that Students will be able to successfully operate Etscorn Observatory’s telescopes with limited supervision. Students will be able to assess the robustness of an observational result through error analysis. Students will demonstrate skill identifying important scientific topics amendable to observational attack by creating and defending specific proposals. Through proposal critique, students will discuss techniques for successful scientific argumentation. Students will also develop technical writing skills through the preparation of lab reports and proposals.

Course Requirements:

Required Text(s): Phys 328 Lab manual [Provided by the Instructor/on webpage] Stars and Planets (4th edition) — Jay M. Pasachoff [Or any equivalent text or computer application]

Pre/Co-requisites: Pre-req: PHYS 327L

Other Required Material:

1. A flash light with a red light or covering (e.g. red cellophane)
2. a compass (your cellphone may have this already)
3. a protractor (the big hobby ones are best but a standard small one and a ruler will work)

4. a notebook/pens & pencils (for recording observations)

5. *(Recommended)* if you have a smart device installing a planetarium app (there are several good, free ones) is worthwhile

|Workload:|  
|---|---|
|The class will consist of a series (~4-5) of labs distributed throughout the semester. The mathematical difficult of the labs should be quite modest. Due dates will vary because the labs require different observing intervals to complete (ranging from a week to >month). The TA will be in charge of scheduled observing runs at Etscorn. Working in small observing teams is expected for a number of labs. The first two or three labs will act to further the students experience running the Etscorn Observatory equipment. Upon completion, each student will come up with a proposed observation project. From these, two projects will be identified to serve as the final two labs to execute before term ends.|

|Lectures:|  
|---|---|
|There will be a short lecture period once a week where we will provide introductions, tips on general observing and data reduction/analysis strategy, and planning of observing. Attendance is required. Attendance and participation are vital parts of your grade.|

|Reports:|  
|---|---|
|The laboratory reports for the class will be the major component of the grade. They need to be written clearly (typed is preferred, except for math and field sketches), thorough, and properly cited/referenced. While observing and basic data reduction are often done in groups, the lab reports must be done individually. (Nearly) identical reports from group members are considered academic dishonesty and subject to the University’s policy on academic honesty (see below). Your lab report format may change slightly based on the specifics of the lab, but should generally conform rather tightly to the following basic structure:|
| 1) Title/Author|  
| 2) Lab partners|  
|   - A specific breakdown of which observational components of the presented lab work was done by each member of the team|  
| 3) Introduction|  
| 4) Methods (or Observations and Data Reduction)|  
|Include for each part of the project:|  
|   a) the method of observation (e.g. naked eye, telescope, CCD, etc.)|  
|   b) time/date of observation|  
|   c) specific ground location from which you observed|  
|   d) quality of said location (city lights, trees blocking view, busy foot traffic, quality of seeing/twinkling, weather conditions, etc.)|  
|   e) Instrumental setup (telescope type, focal length, aperture; eyepiece focal length, magnification; integration time, filters used; method of measuring sky angles, etc...)|  
|For each observation include a description of the methodology used to execute it, an estimate of the uncertainty in your measurement and a brief description of how you arrived at the uncertainty estimate.|

5) Results
Here is where you present the necessary sketches/images/tabulated measurements made by you/your team.

6) Discussion
   a) present mathematical derivations
   b) interpret the measurements scientifically
   c) answer the proposed questions in the lab assignment
   d) assess the quality of the data/analysis
   e) discuss any pit-falls run into (if applicable)

7) Conclusion
   One paragraph summarizing the Methods/Results/Discussion sections with an eye toward the overall success of the project. You may also include statements about specific things you learned.

8) References
   cite sources you used to obtain information from outside that presented in the lecture

The minimum length of the report will vary with lab and formatting (font size), but ought to be ~6 - 8 pages (not counting the actual data/sketches/images). Due dates will be set based on the timing of the lab and will be announced in lecture and posted on the class webpage.

Lab Proposal:
The lab proposal should propose a *scientifically based* project that is feasible and requires an observational component on par with other 327L/328L labs (typically plan <2 weeks to complete the observations). The proposal that you will submit to the class is limited to 2 single-spaced pages of text (1 additional page of figures is permitted). The proposal should address: 1) an brief introduction to the topic, 2) why your proposed project is interesting, 3) what are the observational demands of the project, 4) a justification of the feasibility of the project, and 5) references to relevant work.

Grading:
   Attendance..........................10 %
   Participation........................15 %
   Procedure ..........................20 %
   Lab Reports ..........................40 %
   Lab Proposal ..........................15 %

(Nominally grades will be on a 90-100%; 80-90 %; 70-80 %; etc. scale, but I reserve the right to curve the grades [upward only].)

The lab reports make up a large portion of the grade so do them carefully. Since the number of lab reports due this semester is lower than last, expect to put more effort into each report. You will receive two grades on each report. One for the procedure and one for the report itself. The procedure grade will assess the quality with which you execute the observational task. High quality measurement/imaging will result in a high procedure score. If your observations are poor/inaccurate you will receive a lower procedure score, but you can still receive a high report score if the report is quality and carefully confronts the causes/implications of the poor data. The report grade is controlled by the quality and completeness of the report write-ups.

Rules/Etiquette:
You are responsible for the care of the equipment you use during the observations. Be respectful and careful with all equipment but especially the sensitive optics/cameras. When finished return everything back to their proper place. Dr. Dan Klinglesmith and students are doing astrophysical research at Etscorn. Do your best to be respectful, stay out of their way and if observing is being done and you are taking your car to the observatory, please dim the lights to a low (but still safe to drive) level as you approach the observatory.

Counseling and Disability Statement:

**Reasonable Accommodations:** New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. To schedule an appointment, please call 835-6619.

**Counseling Services:** New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. The confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

**Academic Honesty:** New Mexico Tech’s Academic Honesty Policy for undergraduate students is found starting on page 79 of the 2017-2018 NMT Catalog, see [http://www.nmt.edu/university-catalogs](http://www.nmt.edu/university-catalogs)

You are responsible for knowing, understanding, and following this policy.

**Respect Statement:** New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: New Mexico Tech’s primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community.