

I. CATALOG DESCRIPTION

- A. Division: Science and Math
Department: Astronomy
Course ID: ASTRON 125
Course Title: Astronomy Laboratory
Units: 1
Lecture: 0
Laboratory: 3hr/wk
Prerequisite: ASTRON 120

B. Catalog Description: Our very big universe can be described by a small set of knowable rules through a logical method called science. Laboratory work brings a hands-on enrichment and deeper understanding of topics discussed in the astronomy lecture. Topics include use of star maps, identification of constellations, determination of orbits, rotation rate, and mass of celestial objects using astronomical methods of observation and analysis. Students will also perform 3-D modeling of the solar system and constellations, study the nature of light, lenses and telescopes, make some direct observations with telescopes, and utilize astronomical software.

C. Schedule Description: Our very big universe can be described by a small set of knowable rules through a logical method called science. Laboratory work brings a hands-on enrichment and deeper understanding of topics discussed in the astronomy lecture. Topics include use of star maps and the identification of constellations, the study of celestial objects and motions using astronomical methods of observation and analysis some direct observations with telescopes, and explorations with astronomical software.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course, the student should be able to do the following:

- A. Read and critically evaluate basic scientific literature involving astronomical concepts,
- B. Apply basic scientific principles to new situations,
- C. Identify basic astronomical features in the sky
- D. Recognize and use celestial coordinate systems
- E. Explain how light conveys information about the universe.
- F. Examine image formation by lenses.
- G. Explain the principles and operation of various astronomical instruments.
- H. Analyze the motion of moons and planets.
- I. Compare planetary properties (comparative planetology).
- J. Construct models.
- K. Observe and describe planets, moons, stars, and galaxies.

IV. CONTENT:

Typical experiments performed in the Astronomy laboratory include:

- A. star maps
- B. identification of stars and constellations
- C. the nature of optical systems: telescopes and cameras
- D. quantitative techniques in astronomy: properties of angles, celestial positions
- E. magnitude scales
- F. black body radiation
- G. stellar observations
- H. atomic spectra
- I. Hertzsprung-Russell Diagram
- J. 3-D modeling of constellations

- K. a typical galaxy - Andromeda
- L. expansion of the universe-red shifts
- M. Kepler's laws
- N. modeling the earth-moon system
- O. phases of the moon
- P. lunar features
- Q. telescope observations
- R. introduction to astronomical software

V. METHODS OF INSTRUCTION:

Instructors will include some or all of the following instructional components:

- A. Lecture introduction. May be accompanied by activities such as demonstrations, video, film, and computer simulations, and planetarium presentations.
- B. Specific reading assignments, including text and laboratory work sheets.
- C. Demonstration experiments evoking discussion and problem solving.
- D. Computer aided instruction.
- E. Students will utilize critical thinking in performance of specific problem solving strategies.
- F. Laboratory experimentation. Students work toward specific goals of observation and analysis.
- G. Students write and summarize their laboratory observations. Writing includes background, data analysis, and documentation of principles and apparatus.
- H. Written assignments involving the solution of problems illustrative of various physical situations.
- I. Other written assignments such as library research including analysis of current popular scientific literature.

VI. TYPICAL ASSIGNMENTS:

- A. Perform an internet search on the term Hertzsprung-Russell Diagram. Identify at least three web sites and (i) discuss the content and (ii) rate the value of the site on a scale of 1 to 5.
- B. Describe and discuss the phases of the moon that you observe over the period of one month.
- C. Perform experiment 5 "The atomic spectra of hydrogen".

VII. EVALUATION:

- A. Methods of Evaluation:
 - 1. Grading may be comparative (scaling, curve) or based on an absolute standard.
 - 2. Grading is primarily based on the quality of the laboratory work performed as demonstrated in written laboratory notebooks and reports.
 - 3. Instructors may also utilize some or all of the following components.
 - 4. Objective tests which may include true-false, multiple choice, and matching items.
 - 5. Subjective tests which may include completion items and essay questions.
 - 6. Projects
 - 7. Written assignments
- B. Frequency of evaluation:
 - 1. Weekly evaluation of laboratory work.
 - 2. Other methodologies may be utilized at varying intervals.
- C. Typical exam questions: This class will typically not be evaluated by examination, but rather by performance on laboratory work.

VIII. TYPICAL TEXT(S):

Horizons , M. Seeds, Brooks/Cole, Pacific Grove, CA, 2000

Discovering the Universe , N. Comins & W. Kaufmann, W.H. Freeman, New York, 2000

Explorations, T. Arny, McGraw-Hill, 2000

San Bernardino Valley College
Curriculum Approved: Spring, 2000

Laboratory handouts and work sheets.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: plainisphere