College of San Mateo
Course Outline

☒ New Course
☐ Update/No change
☐ Course Revision (Minor)
☐ Course Revision (Major)

Date: 12/8/11

Department: Astronomy **Number:** 204

Course Title: Application of Astroimaging Techniques **Units:** 4

Total Semester Hours **Lecture:** 32 **Lab:** 96 **Homework:** 64 **By Arrangement:** 0

Length of Course

☒ Semester-long
☐ Short course (Number of weeks_____)
☐ Open entry/Open exit

Grading

☒ Letter
☐ Pass/No Pass
☐ Grade Option (letter or Pass/No Pass)

Faculty Load Credit (To be completed by Division Office; show calculations.)**:**
32/16 = 2 FLCs lecture; 96/16 = 6*.8 = 4.8 FLCs lab

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

ASTR 203

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)

ASTR 204 APPLICATION of ASTROIMAGING TECHNIQUES (4) *Minimum of 32 lecture and 96 lab hours per term.* Prerequisite: *ASTR 203.* Application of techniques learned in ASTR 203 to gather data about celestial bodies. Topics investigated will include the use of spectroscopy to determine stellar composition and photometry to verify times of ingress and egress of transiting extrasolar planets. In addition, observatory control fundamentals will be emphasized and planned imaging runs will be an important component. (AA, CSU)

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)
ASTR 204 APPLICATION of ASTROIMAGING TECHNIQUES (4) *Minimum of 32 lecture and 96 lab hours per term.* Prerequisite: *ASTR 203.* Application of techniques learned in ASTR 203 to gather data about celestial bodies. Topics investigated will include the use of spectroscopy to determine stellar composition and photometry to verify times of ingress and egress of transiting extrasolar planets. In addition, observatory control fundamentals will be emphasized and planned imaging runs will be an important component. (AA, CSU)

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

1) Photograph and identify objects in our solar system, Milky Way, and deep space.
2) Locate and collect data of variable stars to determine their periods, using Binary Maker 3.
3) Locate and take data of extrasolar planets to determine and confirm transit times.
4) Collect spectroscopic data for analysis and expand CSM Stellar Spectra Catalog.

7. **Course Objectives** (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. In this case, "Same as Student Learning Outcomes" is appropriate here.)*

Same as SLO's

8. **Course Content** (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, a sample course syllabus with timeline may be attached.)

ASTROPHOTOGRAPHY – Using skills learned in ASTR 203, image and identify galaxy types, star clusters, and nebulae. Also explore quasars, comets, and solar activity, using CCD cameras, DSLR, and video cameras. Develop further image processing skills, including CCD Stack and Binary Maker 3.

PHOTOMETRY – Using skills learned in ASTR 203, investigate contact binaries, cataclysmic variables stars, long period variables, asteroids, and Kepler extrasolar planets.

SPECTROSCOPY – Using skills learned in ASTR 203, gather spectroscopic data to identify spectral types and temperatures, Doppler shifts, and stellar velocities, using VSpec and other spectra analysis software.

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Describe out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills. **If hours by arrangement are required, please indicate the additional instructional activity which will be provided during these hours, where the activity will take place, and how the activity will be supervised.**)

CSM's Rooftop Observatory – Our observatory is equipped with state of the art telescopes, mounts, CCD and video cameras, and spectrograph for imaging and data gathering. Under proper supervision, students will learn procedures for using equipment, and data processing. This will allow the student to analyze her/his own data of galaxies, quasars, and variable stars.

Required Reading Assignments – In the syllabus, are reading assignments, designed to enable the student to keep abreast of the lectures. Within the reading assignments are links to an instructional website in which students can take practice exams, see demos, etc.

Required Homework Assignments – There are weekly homework assignments that enable the student to further hone their skills in understanding the course material. These assignments are designed to enable the student to think critically in arriving at the answers.

10. **Representative Methods of Evaluation** (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

Portfolio – Photographs, data, graphs, and notes of all work performed.

Exams – There will be from two to three closed book midterm exams. There will also be a final exam that is not cumulative.

Project – There will be a five to eight page written report designed to enable in depth investigation about one aspect of the course. It is found that students can really attain a more thorough understanding of the subject matter once they have written a report.

11. **Representative Text Materials** (With few exceptions, texts need to be current. Include publication dates.)

CSM Imaging Manual –
a) Telescope and CCD camera operation.
b) Photometry procedures.
c) Spectroscopy procedures.
d) Choosing and locating targets using appropriate software and websites.
e) Generating and using appropriate ephemerides.
f) Observatory control, including automated imaging runs.
e) Hand-outs.

On Line Resources – Information about current astronomy events such as comets, asteroids, and solar activity.

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Prepared by: _____
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Submission Date: _____