COMMON COURSE OUTLINE: Course discipline/number/title: ESCI/PHYS 1134 Stellar Astronomy

A. CATALOG DESCRIPTION
1. Credits: 3
2. Hours/Week: 2 hours lecture, 2 hours lab per week
3. Prerequisites (Course discipline/number): Appropriate score on RCTC Placement test with needed score into developmental English.
4. Co-requisites (Course discipline/number): None
5. MnTC Goals (if any): Goal 2/Critical Thinking, Goal 3/Natural Sciences

This course is an introduction to stellar astronomy for the non-science major. The course covers topics that include light spectra, the sun, stars, galaxies, supernovae, black holes and the Big Bang. In addition, students will be introduced to the stunning beauty of the universe as revealed in images, written works and direct experience through the telescope.

Laboratory exercises introduce students to the methods astronomers use to study the universe. Lab work is supplemented by astronomical observing sessions at the RCTC Observatory. NOTE: ESCI 1134 and PHYS 1134 are cross-listed. Students may take one or the other for credit, but will not receive credit for both.

B. DATE LAST REVISED (Month, year): March 2011

C. OUTLINE OF MAJOR CONTENT AREAS:
Topics may include:
1. Radiation and Spectra
2. The Sun: Structure
3. The Sun: Nuclear Powerhouse
4. Kinds of Stars
5. Measuring Distances in the Universe
6. Life Cycle of Stars
7. Milky Way Galaxy
8. Galaxies
9. Quasars and Active Galaxies
10. Black Holes
11. The Big Bang and Cosmology

D. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Use spectra of stars and galaxies to determine the properties and characteristics of those objects.
2. Illustrate the life cycle of stars of different masses.
3. Classify galaxies according to type.
4. Measure the distances to stars and galaxies.
5. Defend the Big Bang theory using scientific evidence.
6. Explain and illustrate the power source of stars.
7. Describe the structure of stars including our Sun.

E. LEARNING OUTCOMES (MNTC): Competencies from the Minnesota Transfer Curriculum (MNTC):
Goal 2/Critical Thinking: The student will be able to:
1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive and conscious of bias in the information selected.
2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives, which can give alternative meaning to a given problem.
3. Analyze the logical connections between facts, goals and assumptions relevant to a problem; evaluate claims, which may be said to follow from them.
4. Describe and improve one’s own critical thinking and problem solving procedures.

Goal 3/Natural Sciences: The student will be able to:
1. Demonstrate understanding of scientific theories and the ways, in which scientists develop, express and question theories in the areas of the earth sciences.
E. **LEARNING OUTCOMES (MNTC):** Continued. . .

2. Formulate and test hypothesis by performing laboratory experiments, requiring collection of data, its statistical and/or graphical analysis and an appreciation of uncertainty and sources of error.

3. Communicate their findings, analysis and interpretations with other students and/or instructor orally and in writing.

F. **METHODS FOR EVALUATION OF STUDENT LEARNING:**

Methods of evaluation may include:

1. Exams
2. Lab exercises
3. Quizzes
4. Written papers
5. Small group projects
6. Students will also be assessed on core outcomes of communication, critical thinking and aesthetic response.
7. Additional assessment will be done via the Astronomy Diagnostic Test or similar assessment vehicle.

G. **RCTC CORE OUTCOME(S) ADDRESSED:**

- [x] Communication
- [ ] Civic Responsibility
- [x] Critical Thinking
- [ ] Personal/Professional Accountability
- [ ] Global Awareness/Diversity
- [x] Aesthetic Response

H. **SPECIAL INFORMATION (if any):**

Included in the initial lab session is a discussion on general safety hazards and safety equipment. During the pre-lab instruction of labs involving hazardous materials or equipment, students are given information pertaining to the use, safety precautions, and disposal of these materials or equipment. The instructor directs all students to wear the necessary protective equipment while working with any hazardous chemicals. A copy of Material Safety Data Sheets for chemicals used is available in the lab.