08-7aa.

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		~~07-43aa~~	App-2/3/09	App-2/24/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Ken Coles	kcoles@iup.edu
Proposing Department/Unit	Phone
Geoscience - Natural Sciences and Mathematics	357-5626

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

_____New Course _____Course Prefix Change _____Course Deletion

__X__Course Revision ____Course Number and/or Title Change __X__Catalog Description Change

GEOS 342 Stellar Astronomy	
***Current** Course prefix, number and full title*	***Proposed** course prefix, number and full title, if changing*

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision

_____New Degree Program _____Program Title Change _____Other

_____New Minor Program _____New Track

***Current** program name*	***Proposed** program name, if changing*

4. Approvals		**Date**
Department Curriculum Committee Chair(s)		2/4/08
Department Chair(s)		2/4/08
College Curriculum Committee Chair		02-11-08
College Dean	Fay Stewart	2-11-08
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph Domaracki TECC	1-26-09
	Mary Ann Rafoth Dean COE-ET	1-26-09
UWUCC Co-Chairs		
	Gail S Sechrist	1-29-09

* where applicable

Received SEP 25 2008 Liberal Studies

Received FEB 14 2008 Liberal Studies

Part II: Description of the Curriculum Change

1. SYLLABUS OF RECORD (NEW)

I. Catalog Description 3 class hours
GEOS 342 Stellar Astronomy 3 lab hours
4 credit hours
Prerequisites: MATH 121, PHYS 111 or instructor permission (3c-3l-4cr)

Evolution and nature of objects in the universe, including the Sun, stars, and galaxies. Study of methods for gathering astronomical data on motion, distance, and composition.

II. Course Objectives
At the end of this course students will be able to:

1. Apply basic science concepts from physics, chemistry, and biology to stellar astronomy; for example, the laws of motion to binary stars.
2. Explain how the scientific method has been used to solve questions about the universe; for example, how the size and shape of our galaxy were determined.
3. Describe evolution of the Sun, other stars, and galaxies.
4. Summarize the uses of modeling, instrumentation, and technology in study of the universe.
5. Outline major ideas in cosmology and the history of the universe as a whole.

Student outcomes assessment matrix

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment (*denotes assessment for reporting)
1, 3	1a, 1b	1	*Test 1
1, 3	1b, 1d, 2a, 2b, 3a	2	Paper 1, *Paper 2
1	1a	3	Test 1, 2, 3, Paper 1, Paper 2
1, 3	1c, 2a	4	Labs and Lab quizzes
1, 3	1a, 1b, 2b	5	Test 3, Paper 2

III. Course Outline
Lecture

Part A (8 academic hours): Methods for Study of the Universe
1. Light: Its Nature and What It Tells Us
2. Celestial Coordinates and Astronomical Instruments
3. History of Ideas About the Universe
4. Measuring Distance, Motion, and Composition

Part B (8 academic hours): Evolution of the Sun and Stars
1. Character and History of the Sun
2. Star Types and Classification
3. Star Evolution

Part C (8 academic hours): Galaxies and Unusual Stars

1. Recognition and Types of Galaxies
2. Neutron Stars and Pulsars
3. Black Holes and Quasars

Part D (8 academic hours): Universe as a whole

1. Red Shift and the expanding Universe
2. Evidence for Early History of the Universe
3. Models and Evidence for the Fate of the Universe
4. Possible Environments for Life

Seven academic hours are allotted to instruction in, and use of, the planetarium.

Correct operation and maintenance of star projector (3 academic hours)
Constellation identification and celestial navigation skills (3 academic hours)
Student presentations using planetarium projector (1 academic hour)

Three academic hours are allotted to exams during the semester.

Final exam during final exam period.

Laboratory Exercises (3 academic hours each)

Week 1:	Sky Coordinates and Constellations
Week 2:	Telescopes
Week 3:	Parallax and Distance
Week 4:	Sunspots
Week 5:	The Aurora and Solar Luminosity
Week 6:	Stellar Magnitude and Luminosity
Week 7:	Hertzsprung-Russell Diagram
Week 8:	Emission Spectra
Week 9:	Binary Stars
Week 10:	Cepheid Variable Stars
Week 11:	Galaxy Classification
Week 12:	Hubble Diagram

Two weeks are allocated for evening telescope observations

IV. Evaluation Methods

Each component of the course will contribute to final grade according to:

Exams	30%
Final Exam	20%
Assignments	10%
Papers	20%
Laboratory Exercises	20%
Total	100%

Papers include an expository paper on an astronomical object or phenomenon, a lesson plan and background paper, and a plan for an observing project. Assignments include critiques on assigned reading, in-class quizzes, and problem sets employing ideas and methods of stellar astronomy.

V. Example Grading Scale

The final grade for this course will be determined using the following schedule:

A=90-100%; B=80-89%, C=70-79%, D=60-69%, F=<60%

VI. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VII. Required textbooks, supplemental books and readings

Moché, D. *Astronomy: A Self-Teaching Guide (6th edition).* Hoboken, N.J.: John Wiley & Sons, 2004.

Approximately six scientific or education papers will be used periodically throughout the course to supplement textbook readings.

VIII. Special resource requirements

This course will make use of the University planetarium in Weyandt Hall to illustrate various principles of Stellar astronomy and for training students in use of a planetarium projector.

IX. Bibliography

In addition to the required textbooks and supplemental readings from science and education journals, the following will be used to develop the course curriculum:

Consolmagno, G. and D. Davis (2000) Turn Left at Orion (3rd edition): Cambridge University Press, Cambridge, England, 224 p.

Gupta, R., editor (2005) *Observer's Handbook 2006* (issued annually): Royal Astronomical Society of Canada, Toronto, 304 p.

Ottewell, G. (2005) *Astronomical Calendar 2006* (issued annually): Sky Publishing Corp., Cambridge, Mass., 82 p.

Pasachoff, J. M. (2002) *Astronomy: From the Earth to the Universe (6th edition)*: Thompson Brooks/Cole, Belmont, Calif., USA, 816 p.

Ridpath, I. (2004) Norton's Star Atlas and Reference Handbook (20th edition): Pi Press/Pearson Education, New York, 196 p.

Seife, C. (2003) *Alpha and Omega: The Search for the Beginning and End of the Universe*: Viking, New York, 294 p.

2. SUMMARY OF PROPOSED REVISIONS

This course will incorporate the content of GEOS 350, Operation of the Planetarium, which will be deleted from the catalog. As a result, an increase from three to four credits is required.

3. JUSTIFICATION/RATIONALE

The course is currently a requirement for the Earth and Space Science Education major. Incorporating the use of the planetarium and other technologies for teaching will reinforce significant concepts in stellar astronomy. The extra lecture hour will permit additional in-depth teaching and learning. For example, the planetarium projector can be used to illustrate why we have seasons, as a model for student presentations on other astronomy topics.

4. OLD SYLLABUS OF RECORD

This course predates the syllabus of record system; no prior syllabus of record is on file. The most recent syllabus of instruction is attached.

Part III. Letters of Support or Acknowledgment

No other departments or programs are affected by this change.

GEOS 342 - Stellar Astronomy
Syllabus - Fall 2007

Dr. Kenneth S. Coles
Office: 136 Weyandt
Phone: 7-5626
Email: kcoles@iup.edu

Geoscience Dept.
Office: 111 Walsh
Phone: 7-2379

Goal

To build a solid understanding of the fundamentals of astronomy, with emphasis on sun, stars, galaxies, the sidereal universe and use of spectroscopy for gathering astronomical data, so that students will be able to incorporate new material into a cohesive whole.
Prerequisites: MATH 121 and PHYS 111

Objectives

Students will:
1. Relate basic science concepts to their application in astronomy; for example, the laws of motion to binary stars.
2. Understand how the scientific method has been used to solve astronomy questions; for example, how the size and shape of our galaxy were determined.
3. Demonstrate orally and in writing an understanding of evolution of the Sun, other stars, and the universe as a whole.
4. Develop an understanding of the uses of modeling, instrumentation, and technology in astrometric research.
5. Improve written synthesis and application of ideas in astronomy in short essays, papers, and lesson plans.
6. Develop an appreciation for both the beauty and usefulness of the night sky.

Text

Astronomy: A Self-Teaching Guide, Moche. 6th edition (2004). Older editions may also be useful. A schedule of assigned readings will be given.
Additional reading from Scientific American Special Edition: The Secret Lives of Stars, 2004 and from some of these journals will also be given: Astronomy, Scientific American, and Sky and Telescope.

Lectures Tues and Thurs 3:30-4:20 P.M, Room 134 Weyandt (Planetarium)

Tues	Thurs		
Aug 28	Aug 30	Position and motion in sky	Position, motion
Sept 4	Sept 6	Light, what it tells us	Light
Sept 11	Sept 13	Astronomical instruments	Radio astronomy
Sept 18	Sept 20	Kepler	Newton, Einstein
Sept 25	Sept 27	Measuring distances	**EXAM 1**
Oct 2	Oct 4	The Solar nebula	Sun: description
Oct 9	Oct 11	Sun: behavior	Measuring star properties
Oct 16	Oct 18	Star types	Hertzsprung-Russell plot
Oct 23	Oct 25	Star birth	Evolution of small stars
Oct 30	Nov 1	Evolution of large stars	**EXAM 2**
Nov 6	Nov 8	Wierdness I: neutron stars	Wierdness II: black holes
Nov 13	Nov 15	Discovering our galaxy	Galaxy types, evolution
Nov 27	Nov 29	Cosmos: the red shift	Microwave Background
Dec 4	Dec 6	Cosmos: future universe	Cosmos: early history

Thursday, December 13, 2007, 12:30 P.M. to 2:30 P.M. - **FINAL EXAM**

Lab Schedule (specific lab schedule will be given in class)
Tues. 8:00-10:45 A.M. Walsh 103 (lab room)

Grading

Test 1	15%	(covers lectures and labs through Sept. 27)
Test 2	15%	(covers lectures and labs from Oct. 2 to Oct. 30)
Final Exam	20%	(a comprehensive test)
Labs	20%	
Assignments	10%	
Papers	20%	

The three tests will include short answer questions, essay questions, and problem solving. They will cover the readings, lectures, and labs. The exams are closed book, closed door. I will provide opportunities to practice writing essay answers if they are new to you. Scores of 90-100% earn an A, 80-89% B, 70-79% C, 60-69% D, 59% and below, F.

Assignments, to be done outside class, will include article critiques and short exercises. The first paper is a short explanation of an astronomical object or phenomenon. There will also be two longer written projects. One will be a plan for teaching a lesson and accompanying background paper on a topic in stellar astronomy. The second will be to design and present in some detail an observing project for a student or amateur. Scoring penalties for late work will apply.

Student outcomes assessment matrix

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment
I, III	1a, 1b	1	*Test 1
I, III	1b, 1d, 2a, 2b, 3a	2	Paper 1, *Paper 2
I, III	1a	3	Test 1, 2, 3, Paper 1, Paper 2
I, III	1c, 2a	4	Labs and Lab quizzes
I, III	1b, 2b	5	Test 3, Paper 2

*Indicates assessments designated for mean and score range aggregated reporting to NCATE and Middle States accreditation bodies. All work submitted for reporting will be anonymous.