REQUEST FOR ADDITION OF NEW COURSE

Department: Physics & Astronomy
College: Science
Date: 2/8/17

PROPOSED COURSE DESCRIPTION

Rubric & No. ASTR1401 Title: Planetary Astrophysics

Short Title (≤ 19 characters) PLANETARYASTROPHYS

Semester Hours of Credit: Three

If combined on course type, # hrs. of credit for

Lecture: __ Lab/Sem/Rec: ___

Repeat Credit Max. (if repeatable): ___ credit hours Graduate Yes No

Credit will not be given for this course and: ASTR 1101

Course Type: (Indicate hours in the appropriate course type.)

Lecture Lab ______ Seminar ______ Recitation ______ Lec/Rec ______ Lec/Sem ______ Lec/Lab ______ Res/Ind ______ Can/Pract ______ Intern ______

Maximum enrollment per section: (use integer, e.g. 25 not 20-30) 25

Grading System: Letter Grade X Pass/Fail Final Exam:** Yes X No

** (Attach justification if the proposed course will not hold a final exam during examination week.)

Course Description:
(Concise course statement exactly as you wish it to appear in the General Catalog)

1401 Planetary Astrophysics (3) Prereq.: credit or registration in MATH 1550 or MATH 1551. A quantitative survey of the physical and environmental properties of planets, the solar system, and other planetary systems. Credit will not be given for this course and ASTR 1101.

BUDGET IMPACT (IF ANSWER TO ANY QUESTION IS "YES", ATTACH EXPLANATION)

If this course is approved, will additional staff be needed? Yes X No

Will additional space, equipment, special library materials or other major expense be involved? Yes X No

Academic Affairs Approval:

ATTACHMENTS (ATTACH THE FOLLOWING TO YOUR PROPOSAL)

JUSTIFICATION: Justification must explain why this course is needed and how it fits into the curricula. Will the course duplicate other courses?

SYLLABUS: Including 14 week outline of the subject matter; titles of text, lab manual, and/or required readings; grading scale and criteria (for 4000-level, specify graduate student grading criteria if requirements differ for graduate and undergraduate students).

APPROVALS

Department Faculty Approval Date 2/7/17 College Faculty Approval Date

Department Chair Signature (date) College Dean Signature (date)

Graduate Dean Signature (date)

Erin Doherty E-mail
College Contact

Chair of S&C Committee (date) 2/14/18

Academic Affairs Approval (date)
REQUEST FOR ADDITION OF NEW COURSE

ASTR 1401 Justification

The current introductory astronomy course that deals with planetary astronomy, ASTR 1101, is designed as a general education course and deliberately uses no math beyond high school algebra, even avoiding the use of trigonometry and definitely not employing calculus. Our own physics majors, who must take this class if they are completing the astronomy concentration, should be given a more thorough introduction to planetary astronomy so they are better prepared to take the upper level astrophysics courses ASTR 4221 and 4222. Also, there are a number of better prepared students who take this ASTR 1101 out of an interest in astronomy who would be better taught using more sophisticated mathematics to give them a deeper insight into the subject. We also believe that by having a smaller class size for these highly motivated students, we may well attract more students into the major.

We examined the current enrollment of ASTR 1101 for Fall 2017, and found 7 physics majors, 46 engineering majors, the largest group being CSC, and 7 other students in majors in the College of Science. This represents about 10% of the enrollment. These are students who must take calculus for their major or as a requirement of their college and who get their general physical science credit through the physics courses they must take for their major. This group is therefore not taking this for general education credit, but simply because they like the subject. If only 50% of these opted to take 1401, this class would be larger than 25 students. This includes only one semester, and since 1401 would be offered only once a year, we see a population of close to 50 students who would be interested in and qualified to take this course.

For now, we will accept either ASTR 1401 or ASTR 1101 for the astronomy concentration, but will encourage our majors to take 1401 in lieu of ASTR 1101. ASTR 1401 and 1402 are independent courses and can be taken in any order. Until we know what the demand for this course, we would offer ASTR 1401 one semester and ASTR 1402 the other semester. If these courses will fill regularly, we will eventually have them replace 1101 and 1102 in the astronomy concentration. Students may earn credit for only one of 1101 and 1401.

Since we anticipate this course will be approved in the 2017-2018 academic year, we would start offering this course in the fall of 2018. We will strongly recommend to all incoming students interested in astronomy, such as the students we see at SPIN, to sign up for this in lieu of 1101.

Planetary Astrophysics

ASTR 1401

Professor: Geoffrey Clayton

Course Description: 1401 Planetary Astrophysics (3) Prereq.: credit or registration in MATH 1550 or MATH 1551. A quantitative survey of the physical and environmental properties of planets, the
solar system and other planetary systems. Credit will not be given for this course and ASTR 1101.

Office: Nicholson 233

Contact information:

Telephone: 578-8275                              Email: jclayto@lsu.edu

Office hours: MTWTF 10:00-11:00


15 Week Course Outline:

Week 1 - Scientific Method, Units of measurement, Lecture Tutorial: “The Parsec”

Week 2 - Motions in the Sky, HW#1: The Moon, Lecture-Tutorials: “Star Charts,” “Path of the Sun”

Week 3 - Motions in the Sky, History of Astronomy, Lecture Tutorials: “Ecliptic,” “Observing Retrograde Motion”

Week 4 - Moon phases, Eclipses, telescopes, gravity, Lecture Tutorials: “Predicting Moon Phases,” “Newton’s Law and Gravity”

Week 5 - Gravity and Light, Lecture Tutorials: “Blackbody Radiation,” “Light and Atoms”

Week 6 - Introduction to the Solar System, Lecture Tutorial: “Sun Size,” “Planet Surface Features”

Week 7 - Jovian vs Terrestrial Planets, Exo-planets, Lecture Tutorials: “Other Moons’ Surface Features,” “Motion of Extrasolar Planets”

Week 8 - Review for test and test#1


Week 10 - Earth/Venus/Mars. Lecture Tutorials: “Mars Climate Change,” “Google Mars”

Week 11 - Mercury + The Moon. Lecture Tutorial: “Moon Crater History”

Week 12 - Review for test and test#2

REQUEST FOR ADDITION OF NEW COURSE

Week 14 - Uranus, Neptune and Pluto, Lecture Tutorial: “Pluto”

Week 15 - SETI and Life on Other Worlds

GRADING Scheme:

LSU letter grades will be assigned according to this table. Your end of semester numerical grades are rounded up to whole numbers (for example, 94.49 = 94, 94.50 = 95)


Final grades will be computed from the following activities:
Two in-class exams 30%
Final exam (cumulative) 30%
Homework 30%
Participation 10%

Description of Activities that will be graded: Describe the activity and the method that will be used to assign a grade.

Two Exams
The exams will be written and will consist of short answer comprehension questions and quantitative problems.

Final Exam
The exams will be written and will consist of short answer comprehension questions and quantitative problems. The Final Exam will be comprehensive.

Homework
Several homework problem sets will be assigned throughout the semester. Example problem: How much would the Philae lander weigh on Comet 67P?

Participation
Be on time and be prepared to participate in all classroom discussions. Class participation is worth 10% of the final grade. Students will work in groups to solve 2-3 problems each class.

Time Expectations

LSU’s general policy states that for each credit hour, a student should plan on at least two hours outside of class working on activities related to the course (homework, exam preparation, etc). Since this is a three credit hour course, you should expect to devote a minimum of six hours outside of class each week on work for this class.

LSU student code of conduct
REQUEST FOR ADDITION OF NEW COURSE

The LSU student code of conduct explains student rights, excused absences, and what is expected of
student behavior. Students are expected to understand this code as described here:
http://students.lsu.edu/saa/students/code. Any violations of the LSU student code will be duly reported
to the Dean of Students.

Disabilities
We are in compliance with The Americans with Disabilities Act and the Rehabilitation Act of 1973, as
amended, Section 504.
Any student with a documented learning, physical, psychological, or other disability that
significantly impacts academic pursuits is potentially eligible to receive accommodations. Contact
disability services for accommodations for scheduled exams.
**REQUEST FOR ADDITION OF NEW COURSE**

**PROPOSED COURSE DESCRIPTION**

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<th>ASTR1402</th>
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**Course Description:**

(Condense catalog statement exactly as you wish it to appear in the General Catalog)

1402 The Astrophysics of Stars & Galaxies (3) Prereq.: credit or registration in MATH 1550 or MATH 1551. A quantitative survey of the physical properties of stars, nebulae, galaxies, and cosmology. Credit will not be given for this course and ASTR 1102.

**BUDGET IMPACT (IF ANSWER TO ANY QUESTION IS "YES", ATTACH EXPLANATION.)**

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<th>If this course is approved, will additional staff be needed?</th>
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<th>Will additional space, equipment, special library materials or other major expense be involved?</th>
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**ATTACHMENTS (ATTACH THE FOLLOWING TO YOUR PROPOSAL)**

**JUSTIFICATION:** Justification must explain why this course is needed and how it fits into the curricula. Will the course duplicate other courses?

**SYLLABUS:** Including 14 week outline of the subject matter; titles of test, lab manual, and/or required readings; grading scale and criteria (For 4000-level, specify graduate student grading criteria if requirements differ for graduate and undergraduate students).

**APPROVALS**

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<th>Chair, FS CS Committee (date)</th>
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ASTR 1402 JUSTIFICATION

The current introductory astronomy course that deals with stellar and galactic astronomy, ASTR 1102, is designed as a general education course and deliberately uses no math beyond high school algebra, even avoiding the use of trigonometry and definitely not employing calculus. Our own physics majors, who must take this class if they are completing the astronomy concentration, could be given a more thorough introduction to planetary astronomy that would make them better prepared to take the upper level astrophysics courses ASTR 4221 and 4222. Also, there are a number of better prepared students who take this class out of an interest in astronomy who would be better taught using more sophisticated mathematics to give them a deeper insight into the subject. We also believe that by having a smaller class size for these highly motivated students, we may well attract more students into the major.

We examined the current enrollment of ASTR 1102 for Fall 2017, and found an additional group of 30 of science and engineering majors in addition to 8 physics majors. This represents about 12% of the enrollment. These are students who must take calculus for their major or as a requirement of their college and who get their general physical science credit through the physics courses they must take for their major. This group is therefore not taking this for general education credit, but simply because they like the subject. If only 50% of these opted to take 1402, this class would be larger than 15 students. This includes only one semester, and since 1402 would be offered only once a year, we see a population of close to 30 students who would be interested in and qualified to take this course.

For now, we will accept either ASTR 1402 or ASTR 1102 for the astronomy concentration, but will encourage our majors to take 1402 in lieu of ASTR 1102. ASTR 1401 and 1402 are independent courses and can be taken in any order. Until we know what the demand for this course, we would offer ASTR 1401 one semester and ASTR 1402 the other semester. If these courses will fill regularly, we will eventually have them replace 1101 and 1102 in the astronomy concentration. Students may earn credit in only 1 of ASTR 1102 and 1402.

Since we anticipate this course will be approved in the 2017-2018 academic year, we would start offering this course in the fall of 2018. We will strongly recommend to all incoming students interested in astronomy, such as the students we see at SPIN, to sign up for this in lieu of 1102.

The Astrophysics of Stars & Galaxies

ASTR 1402

Professor: Geoffrey Clayton

Course Description: 1402 The Astrophysics of Stars & Galaxies (3) Prereq.: credit or registration in MATH 1550 or MATH 1551. A quantitative survey of the physical properties of stars, nebulae,
 REQUEST FOR ADDITION OF NEW COURSE

galaxies, and cosmology. Credit will not be given for this course and ASTR 1102.

Office: Nicholson 233

Contact information:

Telephone: 578-8275

Email: jclayto@lsu.edu

Office hours: MTWTF 10:00-11:00


15 Week Course Outline:

Week 1 - What is a star? What is a galaxy? Powers of Ten, Units, Lecture-Tutorial: “Newton’s Law and Gravity”

Week 2 - Scientific Method, Lecture-Tutorial: “Which should be closer to Earth—the Sun or the Moon—and why? How far away are the stars?” Lecture-Tutorial: “Parallax and distance”, Pizza problem


Week 4 - The lives of the Stars, HW#2 Lifetime of the Sun, Lecture-Tutorial: “Analyzing Spectra,” Eclipses, Telescopes


Week 6 - The Sun, Binary stars, Lecture-Tutorial: “Binary Stars”

Week 7 - Review for test and test#1

Week 8 - Formation of Solar System, Lecture-Tutorial: “Star Formation,” Evolution beyond the Main Sequence

REQUEST FOR ADDITION OF NEW COURSE

Week 10 - Neutron stars and Black holes, Lecture-Tutorial: “If the Sun suddenly became a WD, NS or BH, how would it affect the Earth?”

Week 11 - Review for test and test#2

Week 12 – Cosmology, Lecture-Tutorial: “Making Sense of the Universe and Expansion”

Week 13 – Galaxies, Lecture-Tutorial: “Galaxy Classification”


Week 15 – Dark Matter, Dark Energy, Review for Final Exam

GRADING Scheme:

LSU letter grades will be assigned according to this table. Your end of semester numerical grades are rounded up to whole numbers (for example, 94.49 = 94, 94.50 = 95)

A+ 98-100, A 94-97 1/2 B+ 87-89 1/2 B 84-86, B- 80-83, C+ 77-79 1/2 C 71-76 1/2 C- 68-70, D+ 65-67, D 62-64 1/2 D- 58-61, F 57 and below

Final grades will be computed from the following activities:
Two in-class exams 30%
Final exam (cumulative) 30%
Homework 30%
Participation 10%

Description of Activities that will be graded:

Two Exams
The exams will be written and will consist of short answer comprehension questions and quantitative problems.

Final Exam
The exams will be written and will consist of short answer comprehension questions and quantitative problems. The Final Exam will be comprehensive.

Homework
Several homework problem sets will be assigned throughout the semester. These homework problems will develop skills at problem solving and improve the student’s understanding of the material covered in lecture.

Participation
REQUEST FOR ADDITION OF NEW COURSE

Be on time and be prepared to participate in all classroom discussions. Class participation is worth 10% of the final grade. Students will work in groups to solve 2-3 problems each class.

Time Expectations
LSU’s general policy states that for each credit hour, a student should plan on at least two hours outside of class working on activities related to the course (homework, exam preparation, etc). Since this is a three credit hour course, you should expect to devote a minimum of six hours outside of class each week on work for this class.

LSU student code of conduct
The LSU student code of conduct explains student rights, excused absences, and what is expected of student behavior. Students are expected to understand this code as described here: http://students.lsu.edu/saa/students/code. Any violations of the LSU student code will be duly reported to the Dean of Students.

Disabilities
We are in compliance with The Americans with Disabilities Act and the Rehabilitation Act of 1973, as amended, Section 504. Any student with a documented learning, physical, psychological, or other disability that significantly impacts academic pursuits is potentially eligible to receive accommodations. Contact disability services for accommodations for scheduled exams.