**Department of Astronomy**

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24 November 2010

Larry Krissek, Chair
Committee on Curriculum and Instruction
College of Arts and Sciences
CAMPUS

Re: Proposal for GE Status for Astron 2291 and 2292

Dear colleagues,

The Department of Astronomy is requesting GE status for its beginning astronomy and astrophysics courses Astron 2291 (Basic Astrophysics and Planetary Astronomy) and Astron 2292 (Stellar, Galactic, and Extragalactic Astronomy and Astrophysics). These courses are primarily intended for astronomy majors, but they are suitable for anyone who is interested in learning astronomy at a mathematically challenging level. These courses are intended to fulfill the GE requirement in physical science.

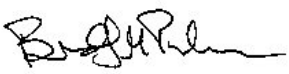
Astronomy currently has two two-quarter GEC sequences that cover the breadth of Astronomy, Astron 161-162 and Astron 171-172. The latter is more rigorous (requiring Math 150) and is intended for BS students. We have not offered this course for some time due to low enrollments, and do not intend to propose them as semester-based courses. However, there is still some interest in a more challenging GEC sequence than Astron 161-162, so as we prepare our semester conversion plan, we would like to propose Astron 2291 and 2292 (currently known as Astron 291-292) as GE courses. The content of these courses is virtually identical to that of Astron 171-172, but Astron 2291-2292 are significantly more rigorous than Astron 171-172, requiring as prerequisites a year of calculus and a year of calculus-based physics.

We attach model semester-based syllabi for these proposed courses.

We note that students from Engineering and other areas of Arts and Sciences have taken Astron 291-292 as free electives and have done well.

Thank you for your consideration.

Sincerely yours,



Bradley M. Peterson
Professor and Chair

**Astronomy 2291: Basic Astrophysics and Planetary Astronomy**
**GE Justification**

We request GE status for Astron 2291. This course is intended to meet the GE requirement in physical science.

The general learning objectives for GE courses in the Natural Sciences are:

(1) To understand the basic principles and central facts of the physical and biological sciences and their interrelationships.
(2) To understand when, where, and how, the most important principles and facts were discovered, thus understanding the key events in the history of science both as events in human history and as case studies in the methods of science.
(3) To understand the interaction between science and technology.
(4) To understand the social and philosophical implications of major scientific discoveries.

Specific learning goals for Astron 2291 include the following:

- Understanding how the Copernican view of the Solar System was arrived at, starting with early Greek astronomy (addresses objectives 2 and 4)
- Understanding how Galileo's use of the telescope as a scientific instrument revolutionized astronomy and humankind's approach to physical science in general (addresses objectives 2, 3, and 4)
- Understanding gravitation in two-body systems, the Solar System, and large systems of stars (addresses objective 1)
- Understanding the fundamental nature of light and how it interacts with matter (addresses objective 1)
- Understanding how modern telescopes work across the electromagnetic spectrum and the impact of large new telescopes and telescopes in space (addresses objectives 2, 3, and 4)
- Understanding the nature of objects in the Solar System and how these lead to conclusions about how the Solar System was formed (addresses objectives 1, 2, 3, and 4)

BMP
24-Nov-2010

# ASTRONOMY 2291 – BASIC ASTROPHYSICS AND PLANETARY ASTRONOMY

## COURSE INFORMATION
## AUTUMN SEMESTER 2012

Lecturer: Professor Bradley M. Peterson
Office: 4055B McPherson Laboratory (MP 4055B), 292-2022
Office Hours: Afternoons before exams or by appointment
Email: *peterson@astronomy.ohio-state.edu*

TA:
Office:
Office Hours:
Email:

Classroom:
Class Hours:
Website: http://www.astronomy.ohio-state.edu/~peterson/Ast2291/

**Textbook:**
Required: *Foundations of Astrophysics* by Barbara Ryden and Bradley M. Peterson (Pearson Addison-Wesley Publishing). This will be the textbook for both Astron 2291 and Astron 2292.

**Course Objectives and Philosophy:**
This is the first course in a two-semester introductory sequence that is intended for sophomore astronomy majors (for whom this is a required course) as well other *scientifically literate* undergraduates who want to learn basic astronomy from a *quantitative* (calculus-based) perspective.

The specific major topics to be covered in this course are (a) celestial mechanics and the dynamics of the Solar System, (b) the interaction between radiation and matter, including how radiation is collected and analyzed by astronomers, and (c) the basic astrophysics of the Solar System.

**Student Learning Goals and Objectives for Astron 2291:**

- Understanding how the Copernican view of the Solar System was arrived at, starting with early Greek astronomy.
- Understanding how Galileo's use of the telescope as a scientific instrument revolutionized astronomy and humankind's approach to physical science in general.
- Understanding gravitation in two-body systems, the Solar System, and large systems of stars.

- Understanding the fundamental nature of light and how it interacts with matter.
- Understanding how modern telescopes work across the electromagnetic spectrum and the impact of large new telescopes and telescopes in space.
- Understanding the nature of objects in the Solar System and how these lead to conclusions about how the Solar System was formed.

**Course Prerequisites:**
Unlike the other introductory astronomy courses, this sequence presupposes a working knowledge of calculus (differential and integral, through Math 1152) and general calculus-based physics (through Physics 1251, which may be taken concurrently with this course).

**Class Attendance Policy:**
It is important to understand that the course is the lectures, and you are responsible for the material presented in class. Class attendance is simply expected, though the professor will not take roll.

**Astronomy 2291 on the World-Wide Web:**
The class webpage is at http://www.astronomy.ohio-state.edu/~peterson/Ast2291/. This page will have all current course information, including copies of the syllabus and course information (the material distributed on the first day of class). Any announcements made in class will also be posted here. You can also use this to send e-mail questions to the professor or the T.A.

**Problem Sets:**
Problems sets will be assigned periodically, and will be due on the dates given on the syllabus. Since this is a problem-solving course, the problem sets are an integral part of the course and play an important role in solidifying your understanding of the material. The problem sets will be graded and will account for 20% of the course grade. Problem sets will be assigned at least one week before they are due. In general, late work will not be accepted for credit, except with prior approval of the professor, and late submissions will be corrected at the T.A.'s leisure. *Please staple all the pages of your homework together*.

**Recitation Sessions:**
Recitation sessions (interactive problem-solving sessions run by one of the T.A.) are scheduled on days before problem sets are due and on days before examinations. Check the schedule carefully. Come prepared with questions.

**Examinations:**
There will be three **midterm examinations**, tentatively scheduled for (1) Wednesday, 19 September, (2) Wednesday, 17 October, (3) Monday, 19 November. Each of the midterm examinations will account for 20% of the course grade.

A comprehensive final examination will be given at TBD, in the regular classroom. The final examination will account for the remaining 20% of the course grade. The final examination will be *open book;* students are allowed to bring in textbooks and notes for the final examination. No notes or books are allowed for the midterm exams, however.

**Make-up Examinations:**
Make-up examinations will be allowed under extraordinary circumstances only (as determined by the professor), e.g., illness (as verified by a physician), or personal tragedy. Make-up midterms usually will be one-hour oral examinations.

If an examination conflicts with an approved University function (e.g., if you are a member of a varsity athletic team or *TBDBITL* and are required to leave town), you may take an exam earlier than the scheduled date, provided that you obtain permission from the professor at least a week in advance.

If you should miss the final examination, your course grade will be recorded as a failure unless you contact Dr. Peterson (by phone, if necessary) before noon on TBD and arrange to take the final at the beginning of (DEADLINE OF NEXT TERM) – in this case you will receive a grade of incomplete.

**Grades:**
Grades will be determined as described above, with equal weight given to the homework, each of the three midterms, and the final exam. Final letter grades will be available on the registrar's website at http://www.ureg.ohio-state.edu as soon as they are determined. Absolutely no grades will be given out over the telephone (University policy).

**Grading Scale:**
While some renormalization of the scale is required each year, the following grading scale will hold approximately:

A: >80%
B: 70 – 80%
C: 60-70%
D 50 – 60%
E <50%

**Course Syllabus:**
A course syllabus will be distributed on the first day of class, and is also available on the class webpage. The syllabus contains all of the important information concerning examination and recitation dates and dates problem sets are due. If you misplace your copy of the course syllabus, get another from the professor or the T.A., or download a copy from the class website.

**Planetarium Demonstration:**
A planetarium demonstration is scheduled during the regular class time on the third day of class, Monday, 27 August. The Planetarium is located in 5033 Smith Laboratory; take

the elevator in the northeast corner of Smith Lab to the fifth floor, turn right and you'll see the Planetarium.

**Astronomy 2895:**
The Department of Astronomy is now offering a two-semester one-credit hour seminar that is intended to introduce prospective astronomy majors to the undergraduate astronomy program at Ohio State. There will be introductory lectures on practical aspects of the major program, including course of study, careers in astronomy, observational facilities available to Ohio State faculty and students, the Center for Cosmology and Astro-Particle Physics (CCAPP) connection with the Department of Physics, and opportunities for engagement of undergraduate students (including a discussion of REU opportunities, the OSU Astronomy Summer Undergraduate Research Program, the Ohio State University Astronomical Society, and OSU outreach opportunities). Each of the remaining sessions will feature an Ohio State faculty member, who will describe his or her research program at a level suitable for first-year undergraduates.

Astronomy majors are required to complete two semesters of Astron 2895. We strongly recommend that you take this course as early as possible in your program of study.

**Roof Nights:**
Roof Nights constitute what might be called a casual laboratory for the 1000-level introductory astronomy courses. Astronomy 2291 students are also cordially invited to attend. The telescopes on the roof of Smith Lab will be opened for you to enjoy the splendor of the Universe (or at least the inner Solar System) firsthand. The Roof Night schedule can be found through a link on the class webpage. The first few of these will be preceded by a planetarium demonstration (5033 Smith Laboratory) lasting about 45 minutes, though it will cover the same material as the scheduled Planetarium Demonstration on the second day of class. Starting times for Roof Nights will change throughout the quarter. And, yes, you can bring a friend.

**Academic Misconduct:**
It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

While we encourage students to work together on their problem sets (since teaching each other and verbally articulating astrophysical arguments are skills we want you to develop), the answers you turn in must be your own work and not simply copied off of another student's work. When you work with other students, you can work out a problem together, but then you should later re-work it independently to make sure you understand it and so that the work you submit is not simply a copy of someone else's solution. It is perfectly fine to trade insights and explanations, but we will not tolerate "distributed" work (e.g., "you work problems 1 – 5 and I'll do problems 6 – 10").

There is an instructor's solution manual published for the textbook: you should not own a copy of this (you can only get it legitimately from the publisher by attesting that you are an instructor and they will check with your institution). You are forbidden to use the instructor's manual in any way. The professor wrote the manual and will recognize his own solutions (and has). Use of the instructor's manual solutions will be considered academic misconduct and will be vigorously prosecuted.

Examinations, of course, must be entirely your own work.

Evidence that academic misconduct has occurred will be turned over to the Committee on Academic Misconduct for disposition.

**Students with Disabilities:**

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

**IMPORTANT: IT IS THE RESPONSIBILITY OF THE STUDENT TO BE FAMILIAR WITH ALL OF THE INFORMATION CONTAINED HERE. STUDENTS ARE ALSO RESPONSIBLE FOR ANY CORRECTIONS OR ADDENDA ANNOUNCED IN CLASS.**

**Astronomy 2291**
**Basic Astrophysics and Planetary Astronomy**

| Week | Date | Day | Topic | Text |
|---|---|---|---|---|
| 1 | 22-Aug | W | Early Astronomy | Chapter 1 |
| | 24-Aug | F | Emergence of Modern Astronomy | Chapter 2 |
| 2 | 27-Aug | M | *Planetarium Demonstration* | |
| | 29-Aug | W | Emergence of Modern Astronomy | |
| | 31-Aug | F | Orbital Mechanics | Chapter 3 |
| 3 | 3-Sep | M | Labor Day - NO CLASS | |
| | 5-Sep | W | *Recitation* | |
| | 7-Sep | F | Orbital Mechanics<br>*Problem Set I due* | |
| 4 | 10-Sep | M | Orbital Mechanics | |
| | 12-Sep | W | The Earth-Moon System | Chapter 4 |
| | 14-Sep | F | The Earth-Moon System | |
| 5 | 17-Sep | M | The Earth-Moon System | |
| | 19-Sep | W | **First Examination** | |
| | 21-Sep | F | Interaction of Radiation and Matter | Chapter 5 |
| 6 | 24-Sep | M | Interaction of Radiation and Matter | |
| | 26-Sep | W | Interaction of Radiation and Matter | |
| | 28-Sep | F | Interaction of Radiation and Matter | |
| 7 | 1-Oct | M | Interaction of Radiation and Matter | |
| | 3-Oct | W | *Recitation* | |
| | 5-Oct | F | Astronomical Detection of Light<br>*Problem Set II due* | Chapter 6 |
| 8 | 8-Oct | M | Astronomical Detection of Light | |
| | 10-Oct | W | Astronomical Detection of Light | |
| | 12-Oct | F | Astronomical Detection of Light | |
| 9 | 15-Oct | M | Astronomical Detection of Light | |
| | 17-Oct | W | **Second Examination** | |
| | 19-Oct | F | The Sun | Chapter 7 |
| 10 | 22-Oct | M | The Sun | |
| | 24-Oct | W | Overview of the Solar System | Chapter 8 |
| | 26-Oct | F | Overview of the Solar System | |
| 11 | 29-Oct | M | Earth and Moon | Chapter 9 |
| | 31-Oct | W | *Recitation* | |
| | 2-Nov | F | Earth and Moon<br>*Problem Set III due* | Chapter 10 |
| 12 | 5-Nov | M | The Planets | |
| | 7-Nov | W | The Planets | |
| | 9-Nov | F | The Planets | |
| 13 | 12-Nov | M | Veteran's Day - NO CLASS | |
| | 14-Nov | W | *Recitation* | |
| | 16-Nov | F | Small Bodies in the Solar System<br>*Problem Set IV due* | Chapter 11 |
| 14 | 19-Nov | M | **Third Examination** | |
| | 21-Nov | W | Thanksgiving - NO CLASS | |
| | 23-Nov | F | Thanksgiving - NO CLASS | |
| 15 | 26-Nov | M | Small Bodies in the Solar System | |
| | 28-Nov | W | The Solar System in Perspective | Chapter 12 |
| | 30-Nov | F | The Solar System in Perspective | |
| 16 | 3-Dec | M | Recitation/Review Session | |
| | TBD | | **Final Examination** | |

| | |
|---|---|
| **Course Bulletin Listing/Subject Area** | Astronomy |
| **Fiscal Unit/Academic Org** | Astronomy - D0614 |
| **College/Academic Group** | Mathematical And Physical Sci |
| **Level/Career** | Undergraduate |
| **Course Number/Catalog** | 2291 |
| **Course Title** | Basic Astrophysics and Planetary Astronomy |
| **Transcript Abbreviation** | Astrphys & Planets |
| **Course Description** | Motions and physical nature of objects in the solar system; electromagnetic radiation, telescopes, and astronomical detectors. |
| **Semester Credit Hours/Units** | Fixed: 3 |

## Offering Information

| | |
|---|---|
| **Length Of Course** | 14 Week |
| **Flexibly Scheduled Course** | Never |
| **Does any section of this course have a distance education component?** | No |
| **Grading Basis** | Letter Grade |
| **Repeatable** | No |
| **Course Components** | Lecture |
| **Grade Roster Component** | Lecture |
| **Credit Available by Exam** | Yes |
| **Exam Type** | EM Tests via Office of Testing |
| **Admission Condition Course** | No |
| **Off Campus** | Never |
| **Campus of Offering** | Columbus |

## Prerequisites and Exclusions

| | |
|---|---|
| **Prerequisites/Corequisites** | Physics 133 or 1251, or concurrent or permission of instructor. |
| **Exclusions** | Not open to students with credit for Astron 291 |

## Cross-Listings

**Cross-Listings**

## Subject/CIP Code

| | |
|---|---|
| **Subject/CIP Code** | 40.0202 |
| **Subsidy Level** | Baccalaureate Course |
| **Intended Rank** | Freshman, Junior, Sophomore, Senior |

## Quarters to Semesters

| | |
|---|---|
| **Quarters to Semesters** | Semester equivalent of a quarter course (e.g., a 5 credit hour course under quarters which becomes a 3 credit hour course under semesters) |
| **List the number and title of current course being converted** | Astron 291, Basic Astrophysics and Planetary Astronomy |

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors
General Education course

## Course Details

**Course goals or learning objectives/outcomes**

**Content Topic List**

- Orbital mechanics and the structure of the Solar System.
- Interaction of matter and radiation.
- Telescopes, detection and analysis of radiation.
- Physical properties, origin, and evolution of Solar System constituents.
- Extrasolar planets.

## Attachments

- Astron2291.pdf

*(Other Supporting Documentation. Owner: Peterson,Bradley Michael)*

## Comments

- Needs to go back to D. Andereck. *(by Vankeerbergen,Bernadette Chantal on 11/10/2010 08:15 AM)*

## Workflow Information

| Status | User(s) | Date/Time | Step |
|---|---|---|---|
| Submitted | Peterson,Bradley Michael | 10/21/2010 01:53 PM | Submitted for Approval |
| Approved | Peterson,Bradley Michael | 10/21/2010 02:44 PM | Unit Approval |
| Approved | Andereck,Claude David | 11/09/2010 04:41 PM | College Approval |
| Revision Requested | Vankeerbergen,Bernadette Chantal | 11/10/2010 08:15 AM | ASCCAO Approval |
| Submitted | Peterson,Bradley Michael | 11/10/2010 10:08 AM | Submitted for Approval |
| Revision Requested | Peterson,Bradley Michael | 11/10/2010 05:55 PM | Unit Approval |
| Submitted | Peterson,Bradley Michael | 11/10/2010 06:03 PM | Submitted for Approval |
| Approved | Peterson,Bradley Michael | 11/10/2010 06:13 PM | Unit Approval |
| Revision Requested | Andereck,Claude David | 11/11/2010 09:42 AM | College Approval |
| Submitted | Peterson,Bradley Michael | 11/16/2010 04:49 PM | Submitted for Approval |
| Approved | Peterson,Bradley Michael | 11/16/2010 04:52 PM | Unit Approval |
| Revision Requested | Andereck,Claude David | 11/23/2010 09:58 AM | College Approval |
| Submitted | Peterson,Bradley Michael | 11/24/2010 04:16 PM | Submitted for Approval |
| Approved | Peterson,Bradley Michael | 11/24/2010 04:19 PM | Unit Approval |
| Approved | Andereck,Claude David | 11/26/2010 09:54 AM | College Approval |
| Pending Approval | Hanlin,Deborah Kay<br>Vankeerbergen,Bernadette Chantal<br>Meyers,Catherine Anne<br>Jenkins,Mary Ellen Bigler<br>Nolen,Dawn | 11/26/2010 09:54 AM | ASCCAO Approval |