PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

DEPARTMENT: Physics
EFFECTIVE SESSION: Fall 2011

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

1. New course with supporting documents
2. Add existing course offered at another campus
3. Expiration of a course
4. Change in course number
5. Change in course title
6. Change in course credit type
7. Change in course attributes (department head signature only)
8. Change in instructional hours
9. Change in course description
10. Change in course requisites
11. Change in semester(s) offered (department head signature only)
12. Transfer from one department to another

PROPOSED:
Subject Abbreviation: ASTR
Course Number: 40100
Long Title: Introduction to Astrophysics
Short Title: Ast

EXISTING:
Subject Abbreviation: 
Course Number: 

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Credit by Examination
5. Special Fees
6. Registration Approval Type

CAMPUS(ES) INVOLVED
Calumet
Cont Ed
N. Central
Tech State/Wil
d
Fl. Wayne
Indiana/Pol
W. Lafayette

Abbreviated title will be entered by the Office of the Registrar if omitted. (20 CHARACTERS ONLY)

CREDIT TYPE
1. Fixed Credit: Cr. Hrs.
2. Variable Credit Range: Minimum Cr. Hs. (Check One) To Or Maximum Cr. Hs.
3. Equivalent Credit: Yes No

SCHEDULE TYPE
Lecture
Recitation
Presentation
Laboratory
Lab Prep
Studio
Distance
Clinic
Experiential
Research
Ind. Study
Prac/Observ

MINUTES PER WEEK
Per Min
50 3

WEEKS OFFERED
13

% OF CREDIT ALLOCATED
100

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
This course is an overview of astrophysics with an emphasis on how physics is applied to astronomy. It will explore the fundamental physical concepts and apply basic principles such as Newton’s laws of motion, Newtonian gravitational and orbital mechanics, electromagnetic waves and behavior, kinetic theory of gases, special and general relativity, and quantum mechanics to astronomical systems.

COURSE LEARNING OUTCOMES:
Students will be able to describe the physics of orbits.
Students will be able to describe electromagnetic radiation for stars.
Students will be able to describe stellar spectra and our interpretation of such.

Cross-Listed Courses

Calumet Department Chair
Date

Fort Wayne Department Chair
Date

Indiana/Pol Department Chair
Date

North Central Faculty Senate Chair
Date

North Central Vice Chancellor for Academic Affairs
Date

West Lafayette Department Chair
Date

West Lafayette College/School Dean
Date

West Lafayette Registrar
Date

OFFICE OF THE REGISTRAR
ASTR 40100  Introduction to Astrophysics  Tentative Syllabus

Instructor: Mark Masters, Ph.D.
Office: KT 127
Phone: 260-481-1653
email: masters@ipfw.edu
web: http://users.ipfw.edu/masters
Office Hours: Officially, Monday 1330-1430, Thursday 1430-1530, By appointment and, unofficially,
    when you can find me.

Description:

This course is an overview of astrophysics with an emphasis on how physics is applied to astronomy.
It will explore the fundamental physical concepts and apply basic principles such as Newton's laws of
motion, Newtonian gravitation and orbital mechanics, electromagnetic waves and behavior, kinetic
time theory of gases, special and general relativity, and quantum mechanics to astronomical systems.

Prerequisites: PHYS 342.

Student Learning Outcomes

Topics
In the beginning: Review of Newton's laws of motion
Celestial Mechanics – Orbits, Keppler's laws
Let there be light: Electromagnetic radiation, Blackbody radiation, Photons
Its all relative: Basic Relativity
Interactions: Interaction of light and matter, atomic spectra, Atoms and photons (again); classification
of stellar spectra.
Atmospherics: Stellar Atmospheres.
Interiors of stars.

Student Learning Outcomes
1. Students will be able to describe the physical bases of orbits.
2. Students will describe the spectra of stars and the use of this spectra to classify stars.
3. The students will be able to explain the failure of the Galilean transformation and how relativity
    effects observations.

Grading: 2 – 50 minute exams  200 points
          1 – 110 minute final  200 points
          Homework and participation  200 points

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80-83%  B-  |  60-63%  D-
77-80%  C+  |  <60%    F

I expect that you can write clearly and concisely in English. I will not give full credit for partial sentences.

I like to have the class have an informal atmosphere. I want you to feel free to ask questions and interrupt. I want you to have fun. Learning new things is fun!

In class, you MUST be an active MEMBER of YOUR class. This means that you must participate. You must THINK! The only things not acceptable in this class are saying “I can’t”, “I won’t”, and being brain dead!

You are required to participate. Answers such as “I don’t know” (which may be true) or shrugs of shoulders are not acceptable. While you may not know an answer you can think about what the answer could be using what we have discussed in class or you have read previously. I WANT you to be thoughtful. I am not worried about whether your answer is wrong as much as if you Think about your answer.

Students are responsible for all materials covered in class and all assignments must be in on time. **No late homework will be accepted.** Exams must be neat and legible, showing all work and answered using complete sentences. Any appearances of copying work will result in a zero grade for all parties.

Homework is for you not for me. As such, you need to complete it so that it benefits you. It is given as an activity to learn from. When you complete a homework assignment, you must think about what you are doing, why are you doing it, what is the physics involved. When you turn in a homework assignment, you must consider that if you come back to it in six months, you will understand what you were doing in answering that assignment.

This class will be presented in a way that is, perhaps, different from any other class you have ever had. The method is known as interactive engagement. In this approach, I will NOT really lecture and YOU will actively participate in your learning. Learning is not a passive activity. For example, you may passively watch a TV show about magnetic levitation. While you may be inspired by the show to investigate magnetism and be aware that magnetic levitation exists, it is unlikely that you will understand it. Understanding is not memorizing. To understand requires work.

Certainly, if I wanted, I could lecture and cover all of the material in the textbook in a single semester. However, how many of YOU would understand any of the material at the end of such a class? My goal is for you to understand the physics. To understand physics you have to think about the physics, work with the physics, wrestle with the physics. Physics is NOT just plugging in numbers to get some answer. There is a deeper understanding to physics. One of the main goals of physics is to take a complex system, simplify it so that we can understand it, then add the complexity back in with a deeper understanding of the system as a whole.

There will be frustration, but frustration is not necessarily a bad thing because it is an indicator of struggling with the ideas. You already have ideas (preconceptions) about physics whether you admit to them or not. In order to replace these preconceptions you have to first recognize that you have a preconception then you have to build new concepts, but that is difficult. My role in this class is to help
you to recognize these preconceptions and to help you build new correct concepts of the physics. My goal is to have you UNDERSTAND the physics.

In particular, you must always consider asking yourself these questions:
• What is happening?
• How do I know what is happening?
• How is this happening?
• Why is that happening?
• Am I being consistent and paying attention to things I already know?