

**Middlesex Community College  
Middletown, Connecticut**

**CRN: 1007**

**Semester: Spring 2017**

**Course Discipline/Number/Name: AST\*F101 Principles of Astronomy**

**Instructor: Dr. Changkun Xie**

**Office: None. Fully online/Blackboard**

**Phone: None**

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**Office Hours: None. Email me through Blackboard at any time.**

**Course Description:**

***AST\*F101 Principles of Astronomy***

The course is an introduction to the study of the solar system, the stars, galaxies, nebulae, and newly discovered celestial bodies, exploring humanity's rapidly growing knowledge of the Cosmos. Topics include: fundamentals of physics applied in astronomy, the Sun as a star and our planetary system; the birth and death of stars; the nature of black holes, pulsars and quasars; the origin of our Solar System and the Universe. Observatory sessions and projects planned as weather permits.

**Number of Credits: 3**

**Prerequisites:** Eligible for either ENG\*101E or ENG\*101 and either MAT\* 085 or MAT\*095 with a "C-" or better or taken concurrently. I will provide a sample self-test on math on Blackboard that you can take that will demonstrate to you the level of difficulty in math you will encounter during this course.

**Required Textbook:**

**(Important note: the package includes 2 items, NOT just the textbook! You will need all 3 items for this course. You will need to get the textbook, and the online access code to Mastering Astronomy)**

The textbook package including mastering astronomy access code can be acquired from the book store:

- TITLE: Astronomy : A Beginner's Guide to the Universe
- AUTHOR: Chaisson, McMillan
- EDITION: 8th
- COPYRIGHT YEAR: 2017
- PUBLISHER: Pearson
- ISBN: 9780134243108
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Also optional is the lecture tutorial booklet.

- Title: Lecture-Tutorials for Introductory Astronomy
- Author: Prather, Slather, Adams, Brissenden

- □ Edition: 3rd
- □ Copyright year: 2012
- □ Publisher: Pearson Addison Wesley
- □ ISBN (13 digit): 9780321820464, (10 digit) 0321820460

### **Course Objectives:**

By the end of the course

**1.** Students will understand the main concepts and physical processes regarding:

1.1 Naked-eye observations, including the difference between the perspective of the celestial sphere model and actual physical processes, the cause of the seasons, and phases of the Moon

1.2 The nature of light, spectra, telescopes, and how they can be used to gain observational knowledge

1.3 The nature of Earth systems, and what they reveal about the properties of the Earth and its origins

1.4 Planetary geology, the nature of the processes, and observations on solar system bodies

1.5 Planetary atmospheres, greenhouse effect, and climate impact

1.6 Solar System formation, the physical processes involved, and evidence for the theory

1.7 The Sun, structure and properties, observational evidence underlying theories

1.8 Stellar observations, properties, classifications, stellar evolution and remnants

1.9 The Milky Way galaxy, observations, theories, dark matter, galactic astronomy

1.10 Introduction to cosmology, the Big Bang theory, observational evidence

**2.** Students will understand the scientific process, including the emphasis on empirical evidence, formulating *questions*, ways to seek answers, and evaluating scientific theories and laws

**3.** Students will be able to use mathematical tools, such as equations, graphs, and tables to learn about astronomical observations and physical processes

What this course is: This course places equal emphasis on content as well as learning the scientific process. This course places heavy emphasis on not just what we know, but how we know what we know.

What this course is not: This course will not be just a list of facts you can look up in tables without thinking. Also, while astronomy historically stemmed from astrology, they have diverged greatly since the scientific revolution, with astronomy becoming a legitimate, robust scientific field, while astrology remaining a pseudoscience. We will not learn astrology in this course, other than its historical connections to astronomy.

**Learning Outcomes:** At the end of the course students will be able to

1. Demonstrate their understanding of astronomical principles using appropriate scientific vocabulary, through summarization, discussion, application, problem solving, and analysis of their learning for each of the topics covered
2. Demonstrate their understanding of the scientific process by citing observations, formulating relevant questions, and discussing scientific theories. Students will be able to differentiate between science and pseudoscience.
3. Apply data, analytical tools, and mathematical tools to solve problems related to certain astronomical topics, including interpreting or creating graphs, solving equations for desired quantities, and interpreting and using tables to learn about certain topics.

### **Instructional Methodology:**

Students will be utilizing a variety of tools made available by the instructor in order for them to learn the desired topics and skills outlined in the course objectives:

- Text reading, both in the book, on provided websites, and in online notes
- Answering questions and problems assigned from the textbook, the lecture tutorial, or assigned through documents or links on Blackboard
- Online research of certain topics
- Discussions with peers on Blackboard
- Quizzes and exams, meant to serve both as checkpoints of understanding and as summative evaluations
- Collecting, organizing, and analyzing data in an extensive observation project

On average, expect to spend at least 8-12 hours/week on this course, about half of which will likely be reading and understanding the textbook and other notes.

### **Grading Policy**

The college uses the following grades and quality points:

A=4.0	B-=2.7	D+=1.3
A-=3.7	C+=2.3	D=1.0
B+=3.3	C=2.0	D-=0.7
B=3.0	C-=1.7	F=0.0

### **Evaluative Criteria:**

Your grade is based on your total number of points accumulated divided by the total number of possible points, tentatively as shown below:

- 6 homework exercises in blackboard @30 points each =180 pts
- 6 blackboard quizzes @20 points each =120 pts
- 7 Discussions in blackboard @10 points each =70 pts
- 1 Final exam in blackboard@80 pts=80 pts
- 1 Observation project in blackboard @100 pts =100 pts
- Total = 550 pts

**Quizzes & Exams.** We will have 6 bi-weekly quizzes and 1 final on blackboard. Quizzes will consist of multiple choice and true/false questions, short essay questions based on material learned from the last 2 weeks. Final exam will consist of multiple choice, matching, diagramming/labeling, and short essay, based on material from the lectures, text, and homework exercises, and assigned readings of the whole semester.

**Homework.** Discussion of homework is allowed and encouraged, however copying of homework is not. All work submitted should represent your own best effort. A schedule of homework assignments and their due dates will be provided by the instructor. All homework assignments are due on blackboard at 7:00pm Friday. Homework assignments must be submitted electronically through Blackboard through the assignment window where you downloaded the respective assignment file. Your submission must be as an attached file. All file submissions must be in one of the following formats: doc, .docx, pdf, .jpg, or .jpeg. Usually, MSWord file is preferred. Other formats are not accepted. In addition, please **only include your answers** in the file you submitted; do not include the original problem sets, but be sure to label your each answer with corresponding problem number.

**Participation/discussion.** Participation is important to your success in this course. All discussion assignments are due on blackboard at 7:00pm Friday. As such it is important that you stay focused, actively contribute, and are courteous to your fellow class mates when posting on discussion forum. Disruptive posts, offensive or off-topic remarks, or lack of participation will negatively impact your grade.

**Semester Observation Project.** The project must be submitted through blackboard as a single file, so learn to insert necessary tables, graphs, etc. into text documents. All submitted assignments/responses have specific, mandatory format requirements. You are expected to produce college-level work that is neat, thorough, and easy to read. Work with significant deviation from formatting requirements, vague responses (e.g. one-word responses, or vague identifiers such as "It"), errors in syntax, grammar, or spelling, will incur point penalties or fail to earn any credit.

**Class Expectations.** Science includes good communication skills (listening, speaking, and writing). I expect us all to practice respect for each other in blackboard when asking questions and listening to each other's ideas and comments – they are an important part of the learning in this course. It is important to be safe, courteous and watch out for each other during the class.

**Make-up Policy:** There are no make-up quizzes, assignments, or discussion postings. Missing one assignment will have a small negative effect on your grade, but regularly missing work will have a significant negative impact on your grade.

Late homework will incur a 33.3% grade penalty per day overdue (counting from 7PM) up to a maximum of 3 days, except when announced otherwise.

The final exam will be administered on the last week of class. If you have a conflict with the final exam and need to take an alternate form on a different date, you will need to provide me with proper, verifiable documentation no later than two weeks prior to the final exam.

**Blackboard and computer use:**

Blackboard will be used as our main means of electronic communication. I will frequently post announcements, homework, discussion topics, homework solutions, etc. and it is expected that you learn to use Blackboard for these functions. A link on how to use Blackboard will be available online from the first week of classes. It is also expected that you **use Blackboard email** to contact me for any questions you may have regarding the course. I will check Blackboard about once a day, and you are expected to do the same.

Note that multiple sources have reported that Blackboard may malfunction when operating with higher versions of Internet Explorer. It is strongly recommended that you obtain an alternate, reliable browser (such as Firefox) and try it out with Blackboard for more reliable functioning.

**IMPORTANT COLLEGE POLICIES!! PLEASE READ CAREFULLY!**

For information about the college's policies and procedures regarding academic honesty, accessibility/disability services, attendance, audio-recording in the classroom, grade appeals, plagiarism, religious accommodations, weather and emergency closings, and more, please go to the following website: [www.mxcc.edu/catalog/syllabus-policies/](http://www.mxcc.edu/catalog/syllabus-policies/) or scan the QR code with your smart phone. Also, please become familiar with the policies regarding nondiscrimination, sexual misconduct, and general student conduct at the following website: [www.mxcc.edu/nondiscrimination/](http://www.mxcc.edu/nondiscrimination/).



**NON-DISCRIMINATION STATEMENT**

Middlesex Community College does not discriminate on the basis of race, color, religious creed, age, sex, national origin, marital status, ancestry, present or past history of mental disorder, learning disability or physical disability, sexual orientation, gender identity and expression or genetic information in its programs and activities. In addition, the College does not discriminate in employment on the additional basis of veteran status or criminal record. The following people have been designated to handle inquiries or complaints regarding non-discrimination policies and practices:

Primary Title IX Coordinator

Dr. Adrienne Maslin; Dean of Students/Title IX and Section 504/ADA Coordinator  
[amaslin@mxcc.edu](mailto:amaslin@mxcc.edu); 860-343-5759; Founders Hall Room 123

Secondary Title IX Coordinator

Ms. Queen Fordham, Coordinator of the Meriden Center Welcome Desk

qfordham@mxcc.edu; 203-608-3011.

### **Course Outline/ Readings**

Below is a tentative schedule of the topics and required readings for the course. Depending on the pace of learning, I may make modifications, *additions*, or cancellations. All updates will be on Blackboard at least 3 days in advance.

Note that because it is impossible to cover everything in the universe in a single semester, some topics are not explored in depth (e.g. naked-eye astronomy, constellations), and a few topics are skipped (e.g. giant planets). However, you are encouraged to explore any topic further on your own.

The reading workload is about two chapters' worth (about 40-60 pages) from the textbook per module *minimum* (in addition to notes I post on BB). Don't fall behind!

I will provide more detail on the readings during the relevant weeks, on what concepts, processes, or observations to focus on (see module outline below).

There will be an assignment, one or more discussion topics, and a quiz for every module, except when noted otherwise. Check for each during your daily login on **Blackboard**. It is also recommended that you ***print out the readings and assignments schedules below*** and refer to them frequently, and **mark any changes I announce** on Blackboard to the schedules immediately upon announcement.

Note that even when the college is closed, you may still have an assignment deadline. If you are taking a break around those days, it is expected that you plan ahead and work around your schedule to meet the deadline (e.g. submit your assignment early).

### Schedule of topics and readings, Spring 2017:

Module (general timeframe)	Topic(s)	Textbook reading (chapter numbers)
1 (Jan 19-Feb 3)	Introductions, naked-eye astronomy, History of astronomy, Planetary motion, Newton's Law	0,1
2 (Feb 6-17)	Light, spectra, Telescopes	2,3
3 ((Feb 20-Mar 3)	Earth & Moon, Planetary geology	Chapter 5,6, sections dealing with the Moon, as well as the formation and geology of planets
4 (Mar 6-Mar 24)	Planetary atmospheres, Solar System formation, small bodies	Chapter 5,6 sections dealing atmospheres of these planets. 4
5 (Mar 27-Apr 7)	Sun, stellar formation and evolution, stellar remnants	9,11,12,13
6 (Apr 10-Apr 21)	Stellar properties, H-R diagram, Milky Way galaxy, distance scale	Chapter 10, 14
7 (Apr 24-May 5)	Galactic astronomy, cosmology	15,16,17
8 (May 10-12)	<b>Final Exam</b>	All material covered during the semester

Homework is assigned at the beginning of each module and is generally due on a **7PM Friday**. Discussions are due the same day and time as the homework for each module. Quizzes will be available **between 7PM Sunday and 7PM Tuesday** after the end of the module, except where noted or announced otherwise.

**ALL DEADLINES**, unless otherwise announced, are at **7PM** on the due dates!

### Schedule of assignments and assessments:

Module	Assignment due	Due date/availability
Introduction	Syllabus Quiz	Due on Tuesday, 1/24
Module 1	Homework1+discussions Quiz 1	Friday, 2/3 Sun-Tue, 2/5-2/7
Module 2	Homework 2+discussion Quiz 2	Friday, 2/17 Sun-Tue, 2/19-2/21
Module 3	Homework 3+discussion Quiz 3	Friday, 3/3 Sun-Tue, 3/5-3/7
Module 4	Homework 4+discussion Quiz 4	Friday, 3/24 Sun-Tue, 3/26-3/28
Module 5	Homework 5+discussion	Friday, 4/7

	Quiz 5	Sun-Tue, 4/9-4/11
Module 6	Homework 6+discussion Quiz 6	Friday, 4/21 Sun-Tue, 4/23-4/25
Module 7	<b>Semester Project</b> due Homework 7+discussion	<b>Friday, 5/5</b> Friday, 5/5
Final week	<b>Final Exam</b>	<b>Wed-Fri, 5/10-5/12</b>

## Bibliography

See textbook information above and internet sources below.

## Internet Related Sites

Mandatory websites:

**<http://my.comnet.edu/>**

You must check Blackboard to read announcements, or complete assignments or quizzes.

**<http://masteringastronomy.com/>**

This website has online activities related to the book. When you purchased your textbook, the package included an access code you will need to create an account on this website. If you purchase your text items separately, you may get the access code directly from this site.

Additional sites that may be used in assignments or discussions (cite if you do!), or you can check for plain old fun:

<http://www.badastronomy.com/index.html>

An excellent source for learning about common astronomy misunderstandings and myths, including the cause of Earth's seasons, the phases of the Moon, common Hollywood misrepresentations, distortions by pseudoscience, etc.

<http://heavens-above.com/>

A fun website where you can learn about what you can view in the sky from your chosen location. Also includes information on visible satellites

<http://spaceweather.com/>

A site with updates on visible astronomical phenomena, primarily geared towards space weather

<http://www.nasa.gov/>

Great *authoritative resource* for astronomy information, primarily geared towards space missions and exploration. Includes online learning tools as well for all ages.

<http://apod.nasa.gov/apod/>

Astronomy Picture Of the Day is a resource for fun pictures, with great cross-links to certain concepts or pictures within the site, and on other sites.

Additional websites may be required during the semester. These will be announced on the relevant assignments, discussions, or notes on Blackboard.