



WACO, TEXAS

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**COURSE SYLLABUS  
AND  
INSTRUCTOR PLAN**

**Stars and Galaxies  
PHYS 1403 80**

**Dr. Bernard Smith**

**NOTE: This is an 8-week course.**

**COVID 19 Notice:**

McLennan Community College is committed to providing you with every resource you need to reach your academic goals including your safety. We will continue to monitor the evolving situation with COVID 19 and adjust our safety guidelines to make sure we offer a safe environment for you and our faculty. Please make sure to consult your faculty and the MCC website at <https://www.mclennan.edu/crisis-management/coronavirus-updates/index.html> on any changes to these guidelines.

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***I reserve the right to change any term on this syllabus at any time during the semester.***

**Course Description:** The course covers the fundamentals of astronomy with emphasis on stellar and galactic astronomy. Topics include properties of stars, nebulae, stellar evolution, neutron stars and black holes, galaxies and quasars, and cosmology.

**Prerequisites and/or Corequisites:** None.

**Instructor Information:**

Instructor Name:	Dr. Bernard Smith
MCC E-mail:	bsmith@mclennan.edu
Office Phone Number:	(254) 299-8196
Office Location:	SB 210
Office Hours:	By appointment.

**Required Text & Materials:** [MCC Bookstore Website](#)

- *Astronomy Today*, 9<sup>th</sup> Edition  
Eric Chaisson and Steve McMillan
- *Mastering Astronomy Student Access Kit*
- *Stellarium* (Lab software)
- A “scientific” calculator: This means something that can handle exponents, trig functions, and logarithms.

Computer Requirements for *Stellarium*:

- Linux/Unix; Windows 7 and later; Mac OS X 10.10.0 and later
- 3D graphics card which supports OpenGL 3.3 and above and GLSL1.3 and later
- 1 GB RAM or more
- 1.5 GB free on disk (About 3GB extra required for the optional DE430/DE431 files).

**Minimum Technical Skills:** Students should have basic computer skills, knowledge of word processing software, and a basic understanding of how to use search engines and common web browsers.

**Backup Plan for Technology:** In the event MCC’s technology systems are down, you will be contacted/notified through your MCC student email address. Please note that all assignments and activities will be due on the date specified by the instructor, unless otherwise noted by the instructor.

**Click Here for the Minimum System Requirements to Utilize MCC’s D2L/Brightspace**  
(<https://www.mclennan.edu/center-for-teaching-and-learning/Faculty%20and%20Staff%20Commons/requirements.html>)

Click on the link above for information on the minimum system requirements needed to reliably access your courses in MCC’s D2L/Brightspace learning management system.

**Additional requirements:** Students must have a reliable computer and internet connection. Students must be able to demonstrate basic computer literacy skills such as keyboarding, sending and receiving email, sending attachments, and using a web browser.

**Methods of Teaching and Learning:** Students will learn through reading the textbook and notes, as well as through work on homework, labs, and, exams. Additional methods may be used as opportunities present themselves.

**Course Objectives:**

1. Describe the scientific method and how it is used in the study of the universe.
2. Describe the motion of the Earth around the Sun, its orientation in space, and how this affects the apparent motion of celestial objects from night to night and from month to month.
3. Describe the motion of the Moon around the Earth and how this motion causes phases and eclipses.
4. Discuss parallax and solve simple problems using this principle.
5. Compare and contrast the ancient Earth-centered models of the universe and the modern view of a Sun-centered solar system.
6. State Kepler's three laws of planetary motion and solve simple problems using these laws.
7. State Newton's three laws of motion and his law of gravity, and solve simple problems using these laws.
8. Discuss the dual nature of radiation and how wave mechanics relates to the study of radiation.
9. Describe the electromagnetic spectrum.
10. Explain how the intensity and wavelength of radiation can be used to determine the temperature of an object and solve simple problems using both Wien's Law and Stefan's Law.
11. Describe the Doppler Effect and solve problems using this theory to probe the motion of distant objects.
12. Discuss how electrons within atoms produce emission and absorption features in the spectra of atoms.
13. List and discuss the kinds of information obtained by analyzing spectral features.
14. Discuss the basic modes of operation of telescopes for the various spectra and the advantages/disadvantages for each type.
15. Describe the physical characteristics of the nearest star, our sun, including the structure of the sun's outer layers, and the various types of solar activity.
16. Discuss how stars generate energy and how this relates to stellar structure.
17. Describe luminosity and distinguish between true and apparent brightness.
18. Discuss how stellar distances are determined and how the masses of stars can be measured.
19. Discuss how the sizes of stars are determined from the laws of physics.
20. Discuss how stars are categorized according to their surface temperature.
21. State the significance of emission nebulae, discuss the role of interstellar dust in dark clouds, and describe the nature and significance of interstellar molecules.
22. Discuss the sequence of events that lead to the formation of main sequence stars.
23. Discuss what happens when a main sequence star exhausts its fuel.
24. Discuss the evolutionary differences between high-mass and low-mass stars.
25. Describe the sequence of events leading to the explosive death of a massive star.
26. Describe the two distinct types of supernova and discuss how heavy elements are formed during supernova explosions.
27. Discuss how neutron stars and black holes fit into the overall theory of stellar evolution.
28. Describe how variable stars are used to determine distances within the Milky Way Galaxy.
29. Discuss how astronomers use radio astronomy to map the galaxy and discuss the overall structure of the Milky Way Galaxy.
30. Describe some of the strange phenomena observed at the center of our galaxy.
31. State the basic properties of normal galaxies.
32. Describe techniques that determine distances and masses of galaxies beyond our galaxy, including Hubble's Law.
33. Discuss the theories of how galaxies form and evolve, describe the basic differences between active and normal galaxies, and list the important features of Seyfert and radio galaxies.
34. State the basic properties of quasars.
35. Discuss how the approximate age of the universe is determined and the leading evolutionary models of the universe.
36. Discuss some of the methods used by astronomers to test their theories of the universe.

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37. Discuss how matter emerged from the primeval fireball and how and when the simplest nuclei and atoms formed.
38. Describe some of the efforts currently underway to unify the known forces in the universe.
39. Discuss the prospects for intelligent life beyond the earth.

**CORE OBJECTIVES – LIFE AND PHYSICAL SCIENCES:** Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

- A. Critical Thinking Skills - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information. These will be assessed through lecture exams, problems assigned for homework, and/or laboratory exercises.
- B. Communication Skills - to include effective development, interpretation and expression of ideas through written, oral and visual communication. These will be assessed by presentations and/or reports based on laboratories, problems, and/or research.
- C. Empirical and Quantitative Skills - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions. These will be assessed through lecture exams, problems assigned for homework, and/or laboratory exercises.
- D. Teamwork - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal. This will be evaluated through group discussions, group laboratory projects, and/or through group presentations.

**Course Outline:** This course will encompass the following material to be divided into three sections. The Core Objectives are covered throughout the entire semester.

Chapter 1 – Charting the Heaven’s	Chapter 20 – Stellar Evolution
Chapter 2 – The Copernican Revolution	Chapter 21 – Stellar Explosions
Chapter 3 – Radiation	Chapter 22 – Neutron Stars and Black Holes
Chapter 4 – Spectroscopy	Chapter 23 – The Milky Way Galaxy
Chapter 5 – Telescopes	Chapter 24 – Galaxies
Chapter 16 – The Sun	Chapter 25 – Galaxies and Dark Matter
Chapter 17 – The Stars	Chapter 26 – Cosmology
Chapter 18 – The Interstellar Medium	Chapter 27 – The Early Universe
Chapter 19 – Star Formation	Chapter 28 – Life in the Universe

**Course Grading Information:**

<b>Homework</b>	25%	<b>Lab</b>	25%
<b>Exams (3)</b>	30%	<b>Final Exam</b>	20%

**Homework:** Homework assignments are conceptual exercises meant to enhance and test your knowledge of the reading material, and involved discussion questions and numeric problems designed to challenge you to gain a deeper understanding of the course material. Homework will be turned in and graded utilizing Mastering Astronomy.

**Lab:** The lab grades will consist of assignments completed from Mastering Astronomy, as well. Some of these will use the Stellarium software. The lab assignment instructions and due dates are given on Mastering Astronomy.

**Exams:** There will be three major exams during the semester. Exam questions will come from the material covered in the textbook, especially material covered in the homework. The exams will be done on Mastering Astronomy.

**Final Exam:** The final exam is comprehensive and has the same format as the other exams. The final exam will be done on Mastering Astronomy.

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**Late Work, Attendance, and Make Up Work Policies:**

**Homework:** Students lose 2% credit per hour for problems completed after the due date and time on Mastering Astronomy.

**Lab:** Lab reports have the same late policy as homework.

**Exams:** Unless there is a college approved, documented excuse no major exam may be made up. Any unexcused exam will result in a grade of zero for that exam.

**Final Exam:** The final exam is required for all students. Unless there is a college approved, documented excuse the final exam may not be made up. Failure to complete the final exam on time will result in a grade of zero for that exam.

Participation is mandatory. The MCC attendance policy states: “In the case of online and hybrid courses, attendance will be determined in terms of participation, as described in the course syllabus.” To that end, there are 26 assignments in this course including homework, labs, and exams. ***Per MCC policy, you will be automatically dropped after missing 25% of these assignments, or 7 assignments.*** If you are dropped before the official drop date, you will receive a grade of W. If you are dropped after the official drop date, you will receive a grade of F, unless there are highly unusual circumstances.

**Student Behavioral Expectations or Conduct Policy:** Students are expected to maintain classroom decorum that includes respect for other students and the instructor, prompt and regular participation, and an attitude that seeks to take full advantage of the education opportunity.

**[Click Here for the MCC Academic Integrity Statement](http://www.mclennan.edu/academic-integrity)** ([www.mclennan.edu/academic-integrity](http://www.mclennan.edu/academic-integrity))  
The link above will provide you with information about academic integrity, dishonesty, and cheating.

**[Click Here for the MCC Attendance/Absences Policy](https://www.mclennan.edu/highlander-guide/policies.html)**  
(<https://www.mclennan.edu/highlander-guide/policies.html>)

Click on the link above for the college policies on attendance and absences. Your instructor may have guidelines specific to this course.

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# McLennan

C O M M U N I T Y

## COLLEGE

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## ACADEMIC RESOURCES/POLICIES

### **Accommodations/ADA Statement:**

Any student who is a qualified individual with a disability may request reasonable accommodations to assist with providing equal access to educational opportunities. Students should contact the Accommodations Coordinator as soon as possible to provide documentation and make necessary arrangements. Once that process is completed, appropriate verification will be provided to the student and instructor. Please note that instructors are not required to provide classroom accommodations to students until appropriate verification has been provided by the Accommodations Coordinator. For additional information, please visit [www.mclennan.edu/disability](http://www.mclennan.edu/disability).

Students with questions or who require assistance with disabilities involving physical, classroom, or testing accommodations should contact:

[disabilities@mclennan.edu](mailto:disabilities@mclennan.edu)

254-299-8122

Room 319, Student Services Center

### **Title IX:**

We care about your safety, and value an environment where students and instructors can successfully teach and learn together. If you or someone you know experiences unwelcomed behavior, we are here to help. Individuals who would like to report an incident of sexual misconduct are encouraged to immediately contact the Title IX Coordinator at [titleix@mclennan.edu](mailto:titleix@mclennan.edu) or by calling Dr. Drew Canham (Chief of Staff for Diversity, Equity & Inclusion/Title IX) at (254) 299-8645. Individuals also may contact the MCC Police Department at 299-8911 or the MCC Student Counseling Center at MCC at (254) 299-8210. The MCC Student Counseling Center is a confidential resource for students. Any student or employee may report sexual harassment anonymously by visiting <http://www.lighthouse-services.com/mclennan/>.

Go to McLennan's Title IX webpage at [www.mclennan.edu/titleix/](http://www.mclennan.edu/titleix/). It contains more information about definitions, reporting, confidentiality, resources, and what to do if you or someone you know is a victim of sexual misconduct, gender-based violence or the crimes of rape, acquaintance rape, sexual assault, sexual harassment, stalking, dating violence, or domestic violence.

**Student Support/Resources:**

MCC provides a variety of services to support student success in the classroom and in your academic pursuits to include counseling, tutors, technology help desk, advising, financial aid, etc. A listing of these and the many other services available to our students is available at <http://www.mclennan.edu/campus-resource-guide/>

College personnel recognize that food, housing, and transportation are essential for student success. If you are having trouble securing these resources or want to explore strategies for balancing life and school, we encourage you to contact a Success Coach by calling (254) 299-8226 or emailing [SuccessCoach@mclennan.edu](mailto:SuccessCoach@mclennan.edu). Students may visit the Completion Center Monday-Friday from 8 a.m.-5 p.m. to schedule a meeting with a Success Coach and receive additional resources and support to help reach academic and personal goals. Paulanne's Pantry (MCC's food pantry) provides free food by appointment to students, faculty and staff based on household size. Text (254) 870-7573 to schedule a pantry appointment. The Completion Center and pantry are located on the Second Floor of the Student Services Center (SSC).

**MCC Foundation Emergency Grant Fund:**

Unanticipated expenses, such as car repairs, medical bills, housing, or job loss can affect us all. Should an unexpected expense arise, the MCC Foundation has an emergency grant fund that may be able to assist you. Please go to <https://www.mclennan.edu/foundation/scholarships-and-resources/emergencygrant.html> to find out more about the emergency grant. The application can be found at [https://www.mclennan.edu/foundation/docs/Emergency\\_Grant\\_Application.pdf](https://www.mclennan.edu/foundation/docs/Emergency_Grant_Application.pdf).

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**Email Policy:**

McLennan Community College would like to remind you of the policy (<http://www.mclennan.edu/employees/policy-manual/docs/E-XXXI-B.pdf>) regarding college email. All students, faculty, and staff are encouraged to use their McLennan email addresses when conducting college business.

A student's McLennan email address is the preferred email address that college employees should use for official college information or business. Students are expected to read and, if needed, respond in a timely manner to college emails.

**Instructional Uses of Email:**

Faculty members can determine classroom use of email or electronic communications. Faculty should expect and encourage students to check the college email on a regular basis. Faculty should inform students in the course syllabus if another communication method is to be used and of any special or unusual expectations for electronic communications.

If a faculty member prefers not to communicate by email with their students, it should be reflected in the course syllabus and information should be provided for the preferred form of communication.

**Email on Mobile Devices:**

The College recommends that you set up your mobile device to receive McLennan emails. If you need assistance with set-up, you may email [Helpdesk@mclennan.edu](mailto:Helpdesk@mclennan.edu) for help.

**Forwarding Emails:**

You may forward emails that come to your McLennan address to alternate email addresses; however, the College will not be held responsible for emails forwarded to an alternate address that may be lost or placed in junk or spam filters.

**Disclaimer:**

The resources and policies listed above are merely for informational purposes and are subject to change without notice or obligation. The College reserves the right to change policies and other requirements in compliance with State and Federal laws. The provisions of this document do not constitute a contract.