Astr 489.01E Stellar Structure and Evolution

COURSE SYLLABUS: FALL 2025

Class Location: Tues. and Thurs. 11:00 AM – 12:15 PM, McFarland Science Building 135

INSTRUCTOR INFORMATION

Instructor: Dr. Kurtis A. Williams, Professor & Department Head
Preferred Pronouns: He/him/his
Office Location: Room 106A, McFarland Science Building
Student Hours:
Tues 1:00-2:30
Wed 1:30-2:30
Fri 2:30-3:30
By Appointment
Zoom meetings available by appointment
University Email Address: Kurtis.Williams@etamu.edu
Preferred Form of Communication**: email or Slack**
Office Phone: (903) 886-5488
Communication Response Time: Before the end of the following business day

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Suggested Book (If you want to continue on to a PhD program):

- Stars and Stellar Processes by Mike Guidry, Cambridge University Press, 2019.

Required Materials

- Access to Google Colab for coding assignments.
  https://colab.research.google.com/

Course Description

Hours: 3
The leading observational facts about stars as interpreted by current theories of stellar structure and evolution. Equations of stellar structure, energy generation and nucleosynthesis, opacity and equation of state, radiative and convective transport, stellar atmospheres and emergent

The *syllabus/schedule are subject to change.*

spectra, stellar evolution and stellar end states. Prerequisites: ASTR 203 and Co/Prequisite (PHYS 321 or PHYS 333).

Note: This class meets at the same time and location as the graduate course ASTR 597. Homeworks and exams for this undergraduate course will differ from those in the graduate class to reflect the difference in course level.

Student Learning Outcomes

1. You will be able to interpret the Hertzsprung-Russell diagram, including physical properties and evolutionary states of stars.
2. You will be able to describe the physics of the basic equations of stellar structure.
3. You will illustrate the evolutionary stages of a solar-mass star, including changes in structure, energy sources, and observable properties.
4. You will model the evolution of stars using open source stellar evolutionary code.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

You will need to be able to use a computer to write and compile code and produce graphs. You will need to create effective presentations using PowerPoint. You will need to be able to typeset equations using LaTeX or other publishing software.

How to Get Started

myLEO Online Access Information

This course uses myLEO Online, the new learning management system at ETAMU. All materials, assignments, and resources will be made available through this system. To access this course, go to: http://myleoonline.tamuc.edu. Log in with your myLEO account and password. Then click on the link to Fall 2025 – Stellar Structure and Evolution to get to our course.

How This Course Is Organized

This course is organized by units. Some units will last just one week, but some units will cover multiple weeks. Some units cover one chapter in the text; some cover multiple chapters. You should listen in class and check the course page on myLeo Online often to see what activities and assignments are coming due.

What Should You Do First?

Read this syllabus and make sure you can access the D2L shell. If you do not already have one, you should create a Google Account for file sharing and collaborative work.

Slack:

I have set up a Slack workspace and channel for this class; Slack and similar tools are widely used in business, so it is a smart idea to get used to it. I will perma-ban anyone who misuses the channel.

Instructional Methods

Participation

In order to give you some encouragement to attend class and keep up with the work, I will take attendance and ask you to participate in group activities on occasion. Participation includes arriving to class on time, participating in discussions, asking questions, and staying through the entire class period. Absences for valid and reasonable reasons will be excused.

Quasi-Quizzes

At the start of some classes, I will give a short "quasi-quiz" with questions that probe whether or not you remember what we discussed in the previous class. For quasi-quizzes, you will get a 70% score *just for finishing the quiz*. You will earn a higher score for each quiz question you answer correctly. You will earn no points if you show up to class late, don't turn in the quasi-quiz, and are not granted an excused absence. You can miss a few quasi-quizzes without greatly hurting your grade very much.

If you are certified as needing special accommodations for examinations, please see me privately well before the exam with you letter of accommodation from the Student Disability Resources and Services office.

Exams

Short exams will be given at the end of major units in class, with dates to be announced at least one week in advance. Exams focus mostly on knowledge you would be expected to have in your head during scientific discussions, meetings, colloquia, etc., especially terminology and basic concepts of stellar astrophysics. Exams generally will not involve strenuous mathematical manipulation but may require brief calculations.

If you are certified as needing special accommodations for examinations, please see me privately well before the exam with you letter of accommodation from the Student Disability Resources and Services office.

Homework

Homework will be assigned for each unit. Homework will be distributed online; due dates will be announced when it is distributed. Each assignment carries the same weight as all other homework assignments. Late homeworks are penalized 20% for each day late. After 5 days, any missing homework will receive a zero.

The following are considered cheating and will not be tolerated: Searching for answers on the internet, using artificial intelligence to complete answers (unless an assignment explicitly asks you to do so), **obtaining copies of solutions to homework questions (whether from past students or other sources), directly copying another student's work, etc. See the section on "Academic Integrity" below for full details.**

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Presentations and Projects:
During the semester you will be asked to read astrophysical papers and present summaries to the class. You will also be asked to complete two projects making use of stellar evolutionary software that will be written up in journal article style.

Student Responsibilities and Tips for Success in the Course

Students who do well in this course share most of the following common habits:

- Arriving a couple minutes early for class and not leaving until class is dismissed.
- Not using phones, tablets, or computers during class
- Checking myLeo Online often for announcements and assignments
- Completing all assignments on time
- Asking for help and advice early in the semester
- Taking responsibility for their own grade.

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% or Below

Grading is on an absolute scale with no competition. If you all earn an A, you all get an A. I may "curve" grades for specific assignments at my discretion; your percentage earned will never go down if I apply such a curve. Your current grades are available through the gradebook on myLEO Online – look for "Total Calculated Grade."

Grades are based on a weighted system. The categories and weights are:

- Attendance: 5%
- Quasi-Quizzes: 5%
- Homework Assignments: 30%
- Exams: 30%
- Presentations and Projects: 20%

COURSE OUTLINE / CALENDAR

The course will cover many of the topics outlined below. The dates below may change, so pay attention to announcements for final due dates.

Unit 1: Observational Properties of Stars

- Properties of Stars
  - Guidry Chapter 1
- The Hertzsprung-Russell Diagram
  - Guidry Chapter 2
- *Exam 1*

Unit 2: Stellar Structure

- Equations of State and Hydrostatic Equilibrium
  - Guidry Chapters 3 & 4
- Nuclear Burning
  - Guidry Chapters 5 & 6
- Energy Transport
  - Guidry Chapter 7
- Solving the Equations of Stellar Equilibrium
  - Guidry Chapter 8
- *Exam 2*

Unit 3: Stellar Evolution

- Overview of Star Formation
  - Guidry Chapter 9
- Main Sequence Evolution
  - Guidry Chapter 10
- Post Main-Sequence Evolution of Low-Mass Stars
  - Guidry Chapter 13
- Post Main-Sequence Evolution of High-Mass Stars
  - Guidry Chapter 14
- End States of Stellar Evolution
  - Guidry Chapters 16 and 17
- *Exam 3*

Unit 4: As Time and Student Interest Allow

- Accreting Systems and Novae
- Supernovae
- Gamma-Ray Bursts
- Stellar Neutrinos
- *Exam 4 (if time allows)*

The final exam (either Exam 3 or Exam 4) will be Tuesday Dec 9th at 10:30 AM.

Important Class Dates:

- Aug 26: First Day of Class
- Oct 30: Last Day to Drop Class

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- Nov 27: **No Class (Thanksgiving)**
- Dec 5: **Last Day of Classes**

TECHNOLOGY REQUIREMENTS

D2L (a.k.a. Brightspace, MyLEO Online, LMS)

All course sections offered by East Texas A&M University have a corresponding course shell in the myLEO Online Learning Management System (LMS). The link below gives technical requirements for accessing the LMS

LMS Browser Support:
https://community.d2l.com/brightspace/kb/articles/5663-browser-support

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@etamu.edu**.**

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Email:
I can be reached by email at Kurtis.Williams@etamu.edu. It may take me up to 24 hours to send you a response (48 hours on the weekend or holidays). If you don't hear back from me in that time, please send another email or give me a call.

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Slack:

I have set up a Slack channel for this class; watch your email for an invitation. I will perma-ban anyone who misuses it.

Student Hours:

Student Hours are available in both real-world and virtual formats. Office hours are times that I set aside when I promise to be in my office so that you can come by and talk to me. During office hours, you can ask questions about the course material, ask about homework, see your current grade, or ask other questions about the class or astronomy in general.

It's important to realize that office hours are *not* just for students who are having problems in the course. If you are uncertain about anything, please visit, email, phone or drop into virtual hours before your small problems grow into big ones. If you are worried about what might be on the test, stop in. If you are curious about astronomy jobs and research opportunities, come by.

Office hours work best if you have your textbook, notes, and homework sets with you.

If you want to talk but cannot come during office hours, please contact me by email in order to set up an individual appointment. By setting an appointment, you both guarantee that I will be in my office (or online) and that I will have plenty of time to talk with you. You may feel free to stop by my office any time my door is open, but if you do not have an appointment and if it is not my scheduled office hours, please understand if I'm not free to talk at that instant.

Social Media:

Please don't follow me on social media until after you've graduated. You'll be disappointed anyway.

Assignment and Due Date Policy

Assignments and due dates will be posted in the main page for each week. Submission requirements for each assignment will also be given on that page.

Dropping the Course

You may drop this course by logging into your myLEO Portal (https://leoportal.tamuc.edu) and clicking on the hyperlink labeled 'Register from Classes' from among the choices found under the Student Resources tab. For more information, see this video: https://www.youtube.com/watch?v=NU5q_58o3uA.

Incompletes

I only offer incompletes in extraordinary circumstances. Any student interested in an incomplete should contact me as soon as possible after the situation arises, and should keep in mind that I have the final decision on whether or not to grant your request.

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Technical Issues

Personal computer problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, an Internet cafe, or a coffee shop, etc.

Administrative Withdrawal

Although I have the right to drop you for excessive absences, I won't do so.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Academic integrity

A major goal of this and most every university course is for you to learn and appreciate subject material. Academic dishonesty ("cheating") actively prevents you from achieving this goal. Academic dishonesty is taken seriously by the University and by me, and ***will not be tolerated.*** (See the TAMU-C Code of Student Conduct and the TAMU-C Procedures A 13.04, 13.12, 13.31, and 13.32.)

This conduct is not only considered wrong in this course and at this University, but also in the real world. Engaging in these activities will get you fired from a job and prevent you from getting another job.

Unethical student conduct includes:

- **Plagiarism**, or copying the words of others with the intent of making it look like your own. Whether you use someone else's phrase word for word, or whether you try and change a few words, or even if you just borrow someone else's original idea and don't give them credit, that's unethical. Use your own words whenever possible, give credit to wherever you got an idea, and put direct quotes inside quotation marks.
- **Cheating** involves trying to trick me or others into thinking you did work that you really didn't do, or into thinking you know what you really don't know. This can include stealing exams, changing your answers on a graded exam or assignment and claiming it was graded wrongly, putting your name on someone else's homework, and so on.
- **Searching the Internet for homework solutions and entering answers you find**. Searching the Internet for help on a topic is okay. For example, suppose a question asks, "Describe the life cycle of a star that has the same mass as the sun." Typing that phrase into Google and cutting and pasting the text in the

answer box is considered cheating. Typing “star life cycles” into Google, reading a few web pages, and summarizing the information in your own words is not cheating.

- **Borrowing a previous student’s homework, exams, or solution sets**. “Borrowing” includes looking at someone’s submitted homework, screen shots, stealing returned homeworks, and so on.
- **Collusion** is working with another person to cheat. This can include copying someone else’s answers to an exam or assignment, doing work for another student, buying or otherwise obtaining homework/exam solutions from any source online or off-line, or any other instance of multiple people engaging in some form of cheating or dishonesty. Working with other students on an assignment is fine as long as everyone contributes and each student does their own work.
- **Unauthorized use of AI content generators**. This includes using ChatGPT or similar tools to create text or content, unless an assignment actually requests you to do so. Using such tools to correct grammar, spelling, or style is acceptable as long as you admit it and submit a link to the log of all prompts and responses.
- **Any other activity that, to a reasonable person, looks wrong.** If you have any doubt whatsoever whether a certain action is considered dishonest, please ask me *before* engaging in the activity. There is no need to be embarrassed about asking, and I won’t penalize you for asking! In this class, if you follow the maxim “it’s easier to beg forgiveness than to ask permission”, don’t expect forgiveness to be forthcoming.

If you engage in academic dishonesty during any graded activity, you will receive no credit for that activity. More than one instance of dishonesty by a student will result in automatic failure of the course and referral of the student for disciplinary action.

For further information, search the ETAMU website for “academic integrity policy”.

D2L provides me with tools that check for common forms of online cheating and collusion. These include, but aren’t limited to: time stamps, location stamps, and automated comparison of essay answers. I will use these tools.

Administrative Withdrawal

Although I have the right to drop you for excessive absences, I won’t do so. You have a right to get an F if you decide to quit working but don’t withdraw.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook: https://www.etamu.edu/student-guidebook/

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: https://www.britannica.com/topic/netiquette

Mental Health and Counseling

The Counseling Center at ETAMU, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.etamu.edu/counseling-center

ETAMU Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01. https://inside.etamu.edu/admissions/registrar/generalInformation/attendance.aspx

Academic Integrity

Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

https://inside.etamu.edu/aboutus/policiesproceduresstandardsstatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03.pdf

Artificial Intelligence

East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

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Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors 'guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
13.99.99.R0.10 Graduate Student Academic Dishonesty

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Services
East Texas A&M University
Velma K. Waters Library 162
Phone (903) 886-5150
Fax (903) 468-8148
Email: StudentDisabilityServices@etamu.edu
Website: Office of Student Disability Resources and Services
https://www.etamu.edu/student-disability-services/

Nondiscrimination Notice

East Texas A&M University will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination, sexual harassment, and retaliation against any individual on the basis of race, color, religion, sex, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, or any other legally prohibited basis. Such discrimination, harassment, and retaliation are violations of A&M System policy and will not be tolerated. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed

handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and ETAMU Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
https://inside.etamu.edu/aboutus/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all ETAMU campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

Sexual Harassment and Violence

Violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc.

If you or someone you know is a victim of harassment, stalking, domestic violence, sexual assault, or related crimes, has been harassed or assaulted, here are some resources for you:

24/7 Resources

- National Domestic Awareness Hotline: 1-800-799-SAFE (7223)
- National Sexual Assault Hotline: 1-800-656-4673
- National Suicide Prevention Lifeline: 988

Campus Resources

- **Call 911 in emergency situations**
- If you or someone you know has been impacted and needs support, email: CARE@etamu.edu (monitored Monday-Friday, 8am-5pm)
- Victim Advocacy and Support: https://www.etamu.edu/student-advocacy-support/victim-support-services/
- How to Help and Report: https://www.etamu.edu/student-advocacy-support/victim-support-services/
- How to Report Concerns About a Fellow Student: https://cm.maxient.com/reportingform.php?TAMUCommerce&layout_id=20
- University Title IX Compliance Office: https://www.etamu.edu/titleix/
- University Title IX Contact: Amanda Berry, 903-886-5991, TitleIX@etamu.edu
- University Police Department Sexual Assault pages: https://www.etamu.edu/university-police-department/crime-prevention/
- University Counseling Center: https://www.etamu.edu/counseling-center/
- Campus police email: upd@etamu.edu

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External resources:

Crisis center of Northeast Texas: http://www.ccnetx.org
Know your IX: https://www.advocatesforyouth.org/campaigns/know-your-ix/
End rape on campus: https://endrapeoncampus.org/
Clery Center for Security on Campus: https://clerycenter.org/
National Sexual Assault Online Hotline: https://hotline.rainn.org/online

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