

Physics 10263 Lab Syllabus

Instructor Name: Dr. Doug Ingram

Semester/Year: Summer 2020

Number of Credits: 3 (when combined with PHYS 10263 LCL 020)

Class Location: SWR 360 and D2L.TCU.EDU

Class Meeting Day(s) & Time(s): MW 13:00-15:00

Office: SWR 315

Office Hours: MW 12:00-13:00 at <https://tcu.zoom.us/j/9198638215>

Telephone: 817-257-7313

Email: d.ingram@tcu.edu

Response Time: I will always respond within 24 hours, usually much more quickly.

Attendance Policy

There will be a total of 10 lab meetings during the June session of Physics 10263. You will be required to attend 9 of these 10 meetings. Attendance will be taken during the first 10 minutes of the introduction to the lab, which begins at 1pm. If you fail to attend and complete a minimum of 9 labs, then one letter grade will be deducted from your overall Physics 10263 course grade. Keep in mind you do not get a separate grade on your transcript for the lecture section and the lab section. You only get one grade for the Physics 10263 course as a whole unit. **If you have fewer than the required nine labs, you will lose one letter grade per missing lab from this overall course grade.**

Course Description

From the catalog, "This course will examine the development of human understanding of the critical events in the origin and evolution of the Universe." In practice, that means we are going to try to understand what exactly Astronomers do and why they do it. For example, Astronomers measure the properties of stars, nebulae and galaxies: color, composition, age, rotation, structure, motion, distance, among other things. What can we learn from these measurements? The history of the entire Universe!

In this lab, we will not only cover how we make these measurements but also how we make the connection to the larger story we are trying to uncover. We will start with some basics to get you familiar with course concepts in a hands-on way. Later, you will be analyzing new data sets from observations made very recently with the newest and most powerful telescopes on Earth (and in orbit). You will in some cases looking at data that no human has ever seen before, with the potential to make new discoveries (and receive credit for them) that will be published in the scientific literature. You'll get a chance to participate in the broader scientific community, and you'll learn what it feels like to explore the unexplored cosmos.

Learning Outcomes

1. Students will measure or deduce properties of stars, galaxies and nebulae such as composition, motion, brightness and distance.
2. Students will demonstrate a basic understanding of some of the methods of investigation in the natural sciences.

Prerequisites / Program or Major Connections

There are no prerequisites for this course.

For those students minoring or majoring in Astronomy, you will learn the basic principles of data collection and analysis that will be used in upper division coursework. You will also learn basic Astronomical terminology (i.e. parallax, Leavitt Law, Hubble Law, galaxy types, spectral line patterns) that will be used extensively in later courses.

Required Texts / Materials

The lab manual for this course is freely available online as a pdf file at:

<http://personal.tcu.edu/dingram/phys10263/>

You may print out the entire lab manual or just one lab at a time as the need arises. You should print out each lab BEFORE the beginning of the lab section so that you will be ready to participate actively in the introductory part of each lab. If you spend the first 10 minutes of our Zoom meeting wrestling with your printer, you will miss important information and will have trouble completing the lab assignment in a timely manner.

Lab assignments are also available under the “Assignments” tab in TCU Online.

Additional / Supplementary Resources

For further reference, you can learn more about the topics covered in these labs in your free online course textbook, OpenStax Astronomy:

<https://openstax.org/details/books/astronomy>

Teaching Philosophy

Education is a lifelong endeavor. It is not meant to be limited to your time in school. The goal of a great educational experience is to give students the tools and motivation to pursue their own education. In this lab course, we will teach you the basics of how Astronomical research is done, and we will show you what kind of questions we can answer with that research. These questions ultimately have to do with our understanding of the nature of the Universe. If you are interested in the answers, this course is just the beginning of your journey to find them.

People who do such work as a lifelong career are scientists, but anyone can do science. We hope to teach you not only how to do science, but why scientists choose to do what they do.

Instructional Methods

This class will be taught synchronously. That means all instruction and lab work will occur during the two-hour window in which the lab meets. There will usually be a 5-10 minute introduction to the material in the lab at the beginning of each lab section. No preparatory work is required ahead of time, but you will need to have a blank copy of the lab ready when lab begins. The labs themselves will provide detailed instructions about what is required.

The labs are meant as a way to explore the scientific endeavor and to provide foundational support for the material we will be covering in lectures.

Course Policies and Requirements

Assignments

Each lab assignment includes the following learning activities:

1. Read or listen to a brief introduction to the topic for that day's lab.
2. Answer a series of guided inquiries based upon the introductory material. Ask questions and/or participate in discussions with your lab instructor and other students as you work through the material.
3. Gather data, make measurements as part of a scientific investigation into the topic. Ask questions and/or participate in discussions with your lab instructor and other students as you gather data to ensure you are gathering the appropriate data, with appropriate precision and appropriate tools.
4. Summarize and draw conclusions from your measurements. Answer a series of guided inquiries about your data gathering, your conclusions and any broader conclusions you can draw from your data. Consider what activities might further illuminate the scientific question being asked.
5. Printing out the actual lab is recommended but not required. You can either complete the lab using the lab pdf's (filling in answers where appropriate), or you can answer the questions posed in the lab on your own paper (you may need to reproduce tables or simple diagrams). Either way, the assignment must be submitted electronically on TCU online before the end of the lab session (3pm).

Date	Topic	Preparation / Reading Assignment	Learning Activity Synchronous Sessions
6/1	Scale Models	Lab 1 – Scale Models	Zoom session – Monday, June 1, 1pm – link posted in Class Announcements Complete lab assignment and submit by Monday, June 1, 3pm.
6/3	Spectroscopy, Composition of Stars, Nebulae and Galaxies, Methods of Investigation	Lab 2 – Spectroscopy	Zoom session – Wednesday, June 3, 1pm – link posted in Class Announcements Complete lab assignment and submit by Wednesday, June 3, 3pm.
6/8	Stellar Brightnesses, Stellar Colors, Stellar Distances, Methods of Investigation	Lab 3 – The Pleiades	Zoom session – Monday, June 8, 1pm – link posted in Class Announcements Complete lab assignment and submit by Monday, June 8, 3pm.
6/10	Stellar Brightnesses, Stellar Distances, Methods of Investigation	Lab 4 – Cepheids	Zoom session – Wednesday, June 10, 1pm – link posted in Class Announcements Complete lab assignment and submit by Wednesday, June 10, 3pm.
6/15	Stellar Brightnesses, Methods of Investigation	Lab 5 – Citizen Science: Variable Star Zoo	Zoom session – Monday, June 15, 1pm – link posted in Class Announcements Complete lab assignment and submit by Monday, June 15, 3pm.

Date	Topic	Preparation / Reading Assignment	Learning Activity Synchronous Sessions
6/17	Stellar Brightnesses, Stellar Distances, Methods of Investigation	Lab 6 – Citizen Science: Supernova Hunting	Zoom session – Wednesday, June 17, 1pm – link posted in Class Announcements Complete lab assignment and submit by Wednesday, June 17, 3pm.
6/22	Galaxy Brightnesses, Galaxy Structure, Galaxy Distances, Methods of Investigation	Lab 7 – Citizen Science: Galaxies	Zoom session – Monday, June 22, 1pm – link posted in Class Announcements Complete lab assignment and submit by Monday, June 22, 3pm.
6/24	Galaxy Structure, Galaxy Distances, Methods of Investigation	Lab 8 – Citizen Science: Galaxy Zoo	Zoom session – Wednesday, June 24, 1pm – link posted in Class Announcements Complete lab assignment and submit by Wednesday, June 24, 3pm.
6/29	Spectroscopy, Galaxy Motions, Galaxy Distances, Galaxy Brightnesses, Methods of Investigation	Lab 9 – Measuring the Hubble Constant	Zoom session – Monday, June 29, 1pm – link posted in Class Announcements Complete lab assignment and submit by Monday, June 29, 3pm.
7/1	Nebula Motions, Nebula Distances, Methods of Investigation	Lab 10 – The Crab Nebula	Zoom session – Wednesday, July 1, 1pm – link posted in Class Announcements Complete lab assignment and submit by Wednesday, July 1, 3pm.

Grading

Labs will typically have grades posted within 48 hours of the conclusion of a lab session.

Final Grade Elements / Grade Breakdown:

Outcome(s)	Assignments, Exams/Quizzes, Presentations, etc.	Percentage	Points
1	Lab 1 – Scale Models	11.1%	100
1, 2	Lab 2 – Spectroscopy	11.1%	100
1, 2	Lab 3 – The Pleiades	11.1%	100
1, 2	Lab 4 – Cepheids	11.1%	100
1, 2	Lab 5 – Citizen Science: Variable Star Zoo	11.1%	100
1, 2	Lab 6 – Citizen Science: Supernova Hunting	11.1%	100
1, 2	Lab 7 – Citizen Science: Galaxies	11.1%	100
1, 2	Lab 8 – Citizen Science: Galaxy Zoo	11.1%	100
1, 2	Lab 9 – Measuring the Hubble Constant	11.1%	100
1, 2	Lab 10 – The Crab Nebula	11.1%	100

Grading Scales

Your average grade for work done in the lab section will contribute 20% toward your overall course grade in Physics 10263.

Late Work

Late work will only be accepted if you actually were in attendance for the lab (present for the Zoom session at the beginning of the lab session) and only if turned in within 24 hours of the 3pm deadline. If you turn in your lab after the 3pm deadline, it will be considered late and be assessed a 20% grade penalty. Once during the semester, we will allow a “late work free pass” for an assignment turned in late. The assignment still must be turned in within 24 hours of the 3pm deadline in order to receive lab credit. Any assignment turned in after the 24 hour “late work” window has lapsed will not receive any credit and will count as an unexcused absence from the lab.

Grading Concerns

If there is a dispute over lab attendance or a grade on a specific lab, student should first attempt to resolve the issue with their lab instructor for that particular lab. If no resolution can be found, then the lab instructor will contact the lab supervisor, Dr. Ingram, who will then conduct an investigation into the matter. Beyond that, if a student remains unsatisfied with the resolution, the student should proceed with a formal grade appeal. The University policy for grade appeals can be found at:

<https://tcu.codes/policies/academic-affairs/grade-appeal/>

Class Norms & Netiquette

All members of the class are expected to follow rules of common courtesy in all email messages, discussions, and chats. If I deem any of them to be inappropriate or offensive, I will forward the message to the Chair of the department and appropriate action will be taken, not excluding expulsion from the course. The same rules apply online as they do in person. Be respectful of other students. Foul discourse will not be tolerated. Please take a moment and read the [basic information about netiquette](http://www.albion.com/netiquette/) (<http://www.albion.com/netiquette/>).

Participating in the virtual realm, including social media sites and shared-access sites sometimes used for educational collaborations, should be done with honor and integrity. Please [review TCU's guidelines on electronic communications](https://tcu.codes/policies/network-and-computing-policy/e-mail-electronic-communications-social-networks/) (email, text messages, social networks, etc.) from the Student Handbook. (<https://tcu.codes/policies/network-and-computing-policy/e-mail-electronic-communications-social-networks/>)

Technology Policies

Email

Only the official TCU student email address will be used for all course notification. It is your responsibility to check your TCU email on a regular basis.

Course Materials

TCU students are prohibited from sharing any portion of course materials (including videos, PowerPoint slides, assignments, or notes) with others, including on social media, without written permission by the course instructor. Accessing, copying, transporting (to another person or location), modifying, or destroying programs, records, or data belonging to TCU or another user without authorization, whether such data is in transit or storage, is prohibited. The full policy can be found at: <https://security.tcu.edu/polproc/usage-policy/>.

Violating this policy is considered a violation of Section 3.2.15 of the Student Code of Conduct (this policy may be found in the Student Handbook at <https://tcu.codes/code/index/>), **and may also constitute Academic Misconduct or Disruptive Classroom Behavior**

(these policies may be found in the undergraduate catalog at <https://tcu.smartcatalogiq.com/current/Undergraduate-Catalog/Student-Policies/Academic-Conduct-Policy-Details>). TCU encourages student debate and discourse; accordingly, TCU generally interprets and applies its policies, including the policies referenced above, consistent with the values of free expression and First Amendment principles.

Academic Misconduct

Academic Misconduct (Sec. 3.4 from the [TCU Code of Student Conduct](#)): Any act that violates the academic integrity of the institution is considered academic misconduct. The procedures used to resolve suspected acts of academic misconduct are available in the offices of Academic Deans and the Office of Campus Life and are listed in detail in the [Undergraduate Catalog](#) and the [Graduate Catalog](#). Specific examples include, but are not limited to:

- **Cheating:** Copying from another student's test paper, laboratory report, other report, or computer files and listings; using, during any academic exercise, material and/or devices not authorized by the person in charge of the test; collaborating with or seeking aid from another student during a test or laboratory without permission; knowingly using, buying, selling, stealing, transporting, or soliciting in its entirety or in part, the contents of a test or other assignment unauthorized for release; substituting for another student or permitting another student to substitute for oneself.
- **Plagiarism:** The appropriation, theft, purchase or obtaining by any means another's work, and the unacknowledged submission or incorporation of that work as one's own offered for credit. Appropriation includes the quoting or paraphrasing of another's work without giving credit therefore.
- **Collusion:** The unauthorized collaboration with another in preparing work offered for credit.
- **Abuse of resource materials:** Mutilating, destroying, concealing, or stealing such material.
- **Computer misuse:** Unauthorized or illegal use of computer software or hardware through the TCU Computer Center or through any programs, terminals, or freestanding computers owned, leased or operated by TCU or any of its academic units for the purpose of affecting the academic standing of a student.
- **Fabrication and falsification:** Unauthorized alteration or invention of any information or citation in an academic exercise. Falsification involves altering information for use in any academic exercise. Fabrication involves inventing or counterfeiting information for use in any academic exercise.
- **Multiple submission:** The submission by the same individual of substantial portions of the same academic work (including oral reports) for credit more than once in the same or another class without authorization.
- **Complicity in academic misconduct:** Helping another to commit an act of academic misconduct.
- **Bearing false witness:** Knowingly and falsely accusing another student of academic misconduct.

TCU Online: Our Learning Management System

Getting Started with TCU Online

Technical Requirements: Check your computer is ready by looking at the [specifications list](https://community.brightspace.com/s/article/Brightspace-Platform-Requirements). (<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>)

Log In: (using your TCU Network Credentials)

1. Access via my.tcu.edu > Student Quick Links > TCU Online
2. Login at the following [website](http://d2l.tcu.edu) (<http://d2l.tcu.edu>) my.tcu.edu

*For information about logging into TCU Online, view these [instructions](http://tcuonline.tcu.edu/kb/how-do-i-log-in/). (<http://tcuonline.tcu.edu/kb/how-do-i-log-in/>).

Student Orientation Tutorial for TCU Online: If you have not yet taken the TCU Online Student Orientation Tutorial, please do so now. To access it, click on the Orientations semester OR view all courses in your My Courses widget visible upon logging in to TCU Online. Click on the "Student Orientation Tutorial" to enter the orientation course. Follow the instructions in the course. You can return to this tutorial at any time.

How This Course Will Use TCU Online

Labs will be posted under "Assignments" in your TCU Online course shell. You will submit your labs there, and your grades will be posted in a timely matter.

Getting Help with TCU Online

If you experience any technical problems while using TCU Online, please do not hesitate to contact the TCU Online (D2L) Help Desk. They can be reached by phone or chat 24 hours a day, 7 days a week, 365 days a year.

Phone: 1-877-325-7778

Chat: Chat is available within TCU Online in the Help menu on the navigation bar.

If you are working with the Help Desk to resolve a technical issue, make sure to keep me updated on the troubleshooting progress.

If you have a course-related issue (course content, assignment troubles, quiz difficulties) please contact me.

Personal Settings & Notifications for TCU Online

As a student, you should set up your account settings, profile, and notifications. To do this you will login to TCU Online and select your name on the top right of the screen. In the Profile area, you can upload a photo of yourself and add personal information. In the Notifications area, you can add your phone number to receive text messages when grades are given as well as reminder texts for upcoming assignments and quizzes.

Student Success Tools for TCU Online

Pulse

[Pulse](#) is a phone app which gives you access to the course calendar, assignments, grades, and announcements. This app provides a graph that can help you manage your time. Based on the number of assignments and events on the course calendar for your classes, the graph will display busy times for class work in the upcoming week. You can use this app to manage your daily workload, and it includes the ability to view and access course materials offline. You can download Pulse from the Google Play or Apple Store. You can learn more and download Pulse here: <https://www.d2l.com/products/pulse/>.

ReadSpeaker

[ReadSpeaker](#) includes a number of tools that can enhance your understanding and comprehension of course materials. ReadSpeaker can create an audio version of content that you can listen to while on a page within a course or that you can download to listen offline. ReadSpeaker can also read Microsoft Office files and PDFs. There are additional tools and features to assist you with reading and focusing in TCU Online, tools that provide support for writing and proofing text, and tools that can read non-TCU Online content aloud. You can learn more about how to use ReadSpeaker tools here: <https://tcuonline.tcu.edu/how-to-hub/instructor-how-to-hub-for-tcu-online/integrations-and-mobile/readspeaker/>

Support for TCU Students

Campus Offices

- Alcohol & Drug Education Center (817-257-7100, Samuelson Hall basement)
- Brown-Lupton Health Center (817-257-7938 or 817-257-7940)
- Campus Life (817-257-7926, Sadler Hall 2006)
- Center for Academic Services (817-257-7486, Sadler Hall 1022)
- Center for Digital Expression (CDeX) (cdex@tcu.edu, Scharbauer 2003)
- Counseling & Mental Health Center (817-257-7863, Samuelson Hall basement)
- Mary Coutts Burnett Library (817-257-7117)
- Office of Religious & Spiritual Life (817-257-7830, Jarvis Hall 1st floor)
- Student Development Services (817-257-7855, BLUU 2003)
- Center for Writing (817-257-7221, Reed Hall 419)
- Transfer Student Center (817-257-7855, BLUU 2003)
- Veterans Services (817-257-5557, Jarvis Hall 219)

Anti-Discrimination and Title IX Information

Statement on TCU's Discrimination Policy

TCU prohibits discrimination and harassment based on age, race, color, religion, sex, sexual orientation, gender, gender identity, gender expression, national origin, ethnic origin, disability, predisposing genetic information, covered veteran status, and any other basis protected by law, except as permitted by law. TCU also prohibits unlawful sexual and gender-based harassment

and violence, sexual assault, incest, statutory rape, sexual exploitation, intimate partner violence, bullying, stalking, and retaliation. We understand that discrimination, harassment, and sexual violence can undermine students' academic success and we encourage students who have experienced any of these issues to talk to someone about their experience, so they can get the support they need.

- [Review TCU's Policy on Prohibited Discrimination, Harassment and Related Conduct or to file a complaint: https://titleix.tcu.edu/title-ix/.](https://titleix.tcu.edu/title-ix/)
- [Learn about the Campus Community Response Team and Report a Bias Incident: https://titleix.tcu.edu/campus-community-response-team/](https://titleix.tcu.edu/campus-community-response-team/)

Statement on Title IX at TCU

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep any information you share private to the greatest extent possible. However, I have a mandatory reporting responsibility under TCU policy and federal law and I am required to share any information I receive regarding sexual harassment, discrimination, and related conduct with TCU's Title IX Coordinator. Students can receive confidential support and academic advocacy by contacting [TCU's Confidential Advocate in the Campus Advocacy, Resources & Education office](https://care.tcu.edu/) at <https://care.tcu.edu/> or by calling (817) 257-5225 or the [Counseling & Mental Health Center](https://counseling.tcu.edu/) at <https://counseling.tcu.edu/> or by calling (817) 257-7863. [Alleged violations can be reported to the Title IX Office](https://titleix.tcu.edu/student-toolkit/) at <https://titleix.tcu.edu/student-toolkit/> or by calling (817) 257-8228. Should you wish to make a confidential report, the Title IX Office will seek to maintain your privacy to the greatest extent possible, but cannot guarantee confidentiality. Reports to law enforcement can be made to the Fort Worth Police Department at 911 for an emergency and (817) 335-4222 for non-emergency or TCU Police at (817) 257-7777.

Obligations to Report Conduct Raising Title IX or VAWA Issues

Mandatory Reporters: All TCU employees, except Confidential Resources, are considered Mandatory Reporters for purposes of their obligations to report, to the Coordinator, conduct that raises Title IX and/or VAWA (Violence Against Women Act) issues.

Mandatory Reporters are required to immediately report to the Coordinator information about conduct that raises Title IX and/or VAWA issues, including any reports, complaints or allegations of sexual harassment, discrimination and those forms of prohibited conduct that relate to nonconsensual sexual intercourse or contact, sexual exploitation, intimate partner violence, stalking and retaliation involving any member of the TCU community, except as otherwise provided within the [Policy on Prohibited Discrimination, Harassment and Related Conduct](#).

Mandatory Reporters may receive this information in a number of ways. For example, a complainant may report the information directly to a Mandatory Reporter, a witness or third-party may provide information to a Mandatory Reporter, or a Mandatory Reporter may personally witness such conduct. A Mandatory Reporter's obligation to report such information to the Coordinator does not depend on how he/she received the information. Mandatory Reporters must provide all known information about conduct that raises Title IX or VAWA issues

to the Coordinator, including the identities of the parties, the date, time and location, and any other details. Failure of a Mandatory Reporters to provide such information to the Coordinator in a timely manner may subject the employee to appropriate discipline, including removal from a position or termination of employment.

Mandatory Reporters cannot promise to refrain from forwarding the information to the Coordinator if it raises Title IX or VAWA issues or withhold information about such conduct from the Coordinator. Mandatory Reporters may provide support and assistance to a complainant, witness, or respondent, but they should not conduct any investigation or notify the respondent unless requested to do so by the Coordinator.

Mandatory Reporters are not required to report information disclosed (1) at public awareness events (e.g., "Take Back the Night," candlelight vigils, protests, "survivor speak-outs," or other public forums in which students may disclose such information (collectively, public awareness events); or (2) during an individual's participation as a subject in an Institutional Review Board approved human subjects research protocol (IRB Research). TCU may provide information about Title IX rights and available resources and support at public awareness events, however, and Institutional Review Boards may, in appropriate cases, require researchers to provide such information to all subjects of IRB Research.

911 for an emergency and (817) 335-4222 for non-emergency or TCU Police at (817) 257-7777.

Statement of Disability Services at TCU

Disabilities Statement: Texas Christian University complies with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973 regarding students with disabilities.

Eligible students seeking accommodations should contact the [Coordinator of Student Disabilities Services in the Center for Academic Services](http://www.acs.tcu.edu/disability_services.asp) located in Sadler Hall, room 1010 or http://www.acs.tcu.edu/disability_services.asp.

Adequate time must be allowed to arrange accommodations and accommodations are not retroactive; therefore, students should contact the Coordinator as soon as possible in the academic term for which they are seeking accommodations.

Further information can be obtained from the Center for Academic Services, TCU Box 297710, Fort Worth, TX 76129, or at (817) 257-6567.

Each eligible student is responsible for presenting relevant, verifiable, professional documentation and/or assessment reports to the Coordinator. [Guidelines for documentation](http://www.acs.tcu.edu/disability_documentation.asp) may be found at http://www.acs.tcu.edu/disability_documentation.asp.

Students with emergency medical information or needing special arrangements in case a building must be evacuated should discuss this information with their instructor/professor as soon as possible.

Emergency Response Information

Please review [TCU's L.E.S.S. is More public safety video](https://publicsafety.tcu.edu/less-is-more/) to learn about Lockdown, Evacuate, and Seek Shelter procedures. (<https://publicsafety.tcu.edu/less-is-more/>)

[TCU's Public Safety website](https://publicsafety.tcu.edu/) provides maps that show our building's rally point for evacuation and the seek shelter location. (<https://publicsafety.tcu.edu/>)

In the event of an emergency, call the TCU Police Department at **817-257-7777**.

Download the [**Frogshield Campus Safety App**](#) on your phone.

(<https://police.tcu.edu/frogshield/>)

Student Perception of Teaching (SPOT)

Towards the end of the term you will receive an email asking to complete your SPOT for this course. I appreciate your thoughtful and reflective feedback to help make this course successful for future students. You can fill out the SPOT by clicking on the link in the email or in TCU Online when SPOTs open.

TCU Mission Statement

To educate individuals to think and act as ethical leaders and responsible citizens in the global community.