



# PHYS 526 01W – THE QUANTUM UNIVERSE FOR EDUCATORS

**ONLINE COURSE SYLLABUS: SPRING 2018**



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**Course Dates:** Feb 1 – May 12

**Spring Break:** Mar 12 – Mar 16

**Course Time Zone:** Central Time USA

**Online Office Hours** TBA. Office hours will be held weekly via the online meeting application, Zoom. You will receive email invitations to the meeting room on Zoom each week. A Doodle poll will be sent around close to the start of the semester to decide on the best time

**Emails** In emails, please put "PHYS526 Online" in the subject header. I will reply to emails within 24 hours (48 at weekends and holidays). **Note:** *I will exclusively use your TAMUC university email addresses for email communication.*

## COURSE INFORMATION

### Materials – Textbooks, Readings, Supplementary Readings

The 2 required books can be ordered from online retailers for a total of around \$100 or under.

#### Textbooks Required

Orzel, C. (2010), *How to Teach Quantum Physics to Your Dog*, Oneworld Publications, ISBN-10: 1851687793, ISBN-13: 978-1851687794

McIntyre, D. (2012), *Quantum Mechanics: A Paradigms Approach*, Addison-Wesley, ISBN-10: 0321765796, ISBN-13: 978-0321765796

#### Recommended

Baggott, J.M. (2013), *The Quantum Story: A History in 40 Moments*, Oxford University Press, ISBN-10: 0199655979, ISBN-13: 978-0306821448

#### Course Prerequisites

**Math:** Students are required to know mathematics through Calculus 3 or equivalent, or have taken or be concurrently taking the Mathematical Methods for Educators Course (PHYS 530). ***This course makes extensive use of linear algebra, (especially matrix algebra) and complex numbers.*** We will need some differentiation and integration, and the Schrodinger equation, which plays a central role in quantum mechanics, is a second-order differential equation.

**Physics:** A course in calculus-based physics is required. Some knowledge of basic thermodynamics and statistical mechanics will be an advantage, but I will explain concepts from those subjects when we need to use them.

#### Course Description

The history of quantum mechanics including the experimental results that required a new theory of the interaction between light and matter at microscopic level. The uncertainty principle, wave-particle duality and wave mechanics. Applications (including simple calculations) to atomic physics, nuclear physics, semiconductors, lasers; how quantum mechanics has

shaped the modern world. The impact of quantum mechanics in our culture; its uses and misuses. Prerequisites: University physics and calculus up to partial differential equations (2015 TAMUC Graduate Catalog).

Quantum theories underpin our modern world. Without quantum mechanics, modern electronic devices such as computers, cell phones, most modern medical imaging and technology, most development in materials science, the World Wide Web, and many other things would not exist. It is the most accurately tested physical theory that exists - giving numerical predictions verified by experiments to more decimal places than our theories of gravity, Newton's laws of motion or our laws of thermodynamics.

Quantum mechanics is also most misunderstood and abused scientific theory. Misunderstanding is not surprising. Quantum mechanics makes claims on the nature of reality at the microscopic level running counter to our everyday experience. Some principles of quantum mechanics have made it into popular culture in a distorted way; for example the, notion reality can be affected by the observer. These vague notions are exploited by those who wish to peddle all manner of pseudoscience. It is therefore very important to understand how to interpret quantum mechanics.

In this class, we will learn about the fascinating history of the development of quantum mechanics, the fundamental principles of the theory and the practical and fundamental physics applications, develop lesson plans introducing the exciting physics of quantum theory to high school students, and explain the ways in which the theory can be misunderstood and misused.

The purpose of this class is three-fold:

- 1) To give you a working knowledge of the fundamentals of quantum mechanics and its modern applications. To appreciate how it has created the modern world, and that it is the most precisely tested scientific theory.
- 2) To explore the history and interpretation of quantum theory as an archetype of a scientific revolution, in order understand better how scientific theories develop.
- 3) To discuss the teaching of these at a high school level, examine common misconceptions, explore the many tools available on the web that aid us, and to share experiences and resources as a community.

### **Student Learning Outcomes**

At the end of the course students will:

1. Demonstrate knowledge of the history of quantum mechanics, and argue why it is an exemplar of a scientific revolution.
2. Explain the principles of quantum mechanics, express them mathematically, and apply them to make quantitative predictions in fundamental and applied physical situations.
3. Detail current and future practical applications of quantum mechanics.
4. Summarize the ongoing discussion on the interpretation of quantum mechanics and critically analyze articles in the popular media relating to quantum theory.
5. Create lesson plans which accurately and engagingly introduce quantum physical principles to high school students.

## COURSE REQUIREMENTS

### Instructional Methods / Activities / Assessments

The details of the course structure are given below. Any changes will be communicated via email and announcements on LearningStudio (eCollege). Your TAMUC email account will be used at all times, and it will be your responsibility to check it regularly (at least once every 24 hours).

### *Introductory week tasks, material and due dates*

The semester starts at **12.01 a.m. February 1st**. From then you will have access to the **Course Home** (which appears on the top left bar of LearningStudio) where you can complete the following introductory activities:

- (1) Read the **Start Here** section near the top of the left side of LearningStudio (eCollege) learn how to access course material and familiarize yourself with the environment.
- (2) Complete the **pre-course assessment**. This will be given again at the end of the course, so we can measure your learning gains on Student Learning Outcomes 1-5. This assessment will **not** count towards your class grade. *It can only be taken once* and once you begin the quiz you will have *40 minutes* to complete it. The assessment must be completed before you can gain access to the first week of the class.
- (3) Read the **syllabus**.
- (4) Take the **syllabus quiz** to make sure you understand the mechanics of the course. This can be taken *any number of times*.

The **syllabus quiz** will not be graded, but it must be completed *with 100% correct answers* before you can gain access to the first week of the class.

- (5) I yourself on the “**Class Introductions**” discussion thread.

***NOTE: You must complete the pre-course assessment and the syllabus quiz (the latter with 100% correct answers) to access week 1’s material.***

### ***Regular week tasks, material and due dates***

The course material will be organized by week. The week’s material will be located under the week’s tab in the left hand menu in LearningStudio (eCollege).

Week 1 is an extended week that starts the first day of the semester, **Thursday Feb 1<sup>st</sup>**, and finishes on **Sunday, Feb 11<sup>th</sup>**. Apart from week 1, each week’s material becomes available each **Friday at 12:01am** and the week ends on the **Sunday** 9 days later at **11.59pm**. For example, week 2 starts on **Friday, Feb 9<sup>th</sup> at 12:01am** and ends **Sunday, Feb 18<sup>th</sup>, 11:59pm**. All of the week’s materials and assignments become available only when the week starts. The sixth week spans Spring Break (12-16 Mar). There will be 13 weeks in total.

When each week opens, it remains open until the end of the semester. Remember, however, that assignments, quizzes and discussion posts must be completed by their respective deadlines in order to receive credit for them.

**Each week**, the following tasks must be completed.

- (1) Complete the **reading assignments**. These will come from the course textbook or online articles and material available in Document Sharing or the Webliography in LearningStudio (eCollege), located on the top menu bar. The reading material for each week will be announced with the week’s material each **Friday at 12.01 a.m.**
- (2) Watch **1-4 Mini-lectures** each week which will cover one or two key concepts at a time, to reinforce reading material, or give examples of problem solving. Mini-lectures for each week will be available with the week’s material each **Friday at 12.01 a.m.**
- (3) Complete the weekly **quizzes** designed to assess students’ comprehension of the reading assignments, mini-lectures and basic

knowledge of key principles. Quizzes for a week's material will be available with the week's material each Friday at **12.01 a.m.** and must be completed by **11.59 p.m. the Sunday 9 days later.**

- (4) Participate in the **discussion threads**. Each week you must make at least 3 substantial posts in each of the current week's threads, and 2 responses to posts from the previous week's threads. A week's discussion thread opens at **12.01 a.m. each Friday** and remains open throughout the semester.
- (5) Complete the **weekly homework**. New homework questions will become available with the week's material at **12.01 a.m. Fridays**. **Important:** New homework questions are set each week, but they will be due roughly every 3 weeks in **Dropbox**. (See the course calendar at the end of this syllabus).
- (6) Two projects will be assigned at about one third and two thirds of the way semester.

*A complete list of due dates **for discussion posts, quizzes and homeworks are given on pp. 24, 25 and 26 of this syllabus.***

### **Learning Activities and Assessments**

The following describes the assignments you must complete which will contribute to your progress through the course and to your final grade, together with how they will be assessed.

- **Quizzes** are designed to assess students' comprehension of the reading assignments, mini-lectures and basic knowledge of key principles, often in response to the mini-lectures and reading assignments.

Quizzes are designed to provide you with assessment of your learning. Half of the quiz grade will be awarded just for completing the quiz; the other half will come from your actual quiz score.

**You will only be able to take quizzes once. Once you begin taking the quiz, you will have a time limit of one hour to complete it. Once completed, you cannot return to it and revise your answers. You will see your score, however, and what answers you got wrong.**

*The quizzes will be found underneath each week's tab on the left side of the LearningStudio window.*

*Quizzes address: Learning Outcomes 1-3*

- **Ongoing Discussions** will be conducted each week on the concepts introduced in the reading material and lectures. A number of threads will be opened, one per topic. Sometimes I will ask a question or pose a problem to get you started. Certain threads require you to post before you see responses of other students; this will be clearly indicated.

Learning and understanding is significantly enhanced by active engagement in the class through continual discussion of topics. All students are required to participate in the discussions with a number of substantive posts. **Students are required to make 3 substantive posts, in three separate threads, giving your thoughts about the reading or answering the opening questions. In addition, students are required to make two posts in the *previous week's* threads, replying to posts of other students or of myself. That makes a total of 5 posts per week that will be graded.**

**The rubric for grading the online discussions** is found on pp.20-21 of the course syllabus.

Of course, continued discussion beyond the minimum posts required is strongly encouraged. I will pitch into the discussion at various times during the week, answering queries and asking new questions to make sure we discuss all the week's material adequately.

When appropriate, at least one thread will be devoted to discussing how one might teach the week's concepts at the undergraduate level, and for the sharing of your own experiences and resources for the benefit of the teaching community.

I hope to make the discussion threads a fun and lively forum throughout the semester!

*The discussion threads will be found underneath each week's tab on the left side of the LearningStudio window.*

*Discussions address: Learning Outcomes 1-4*

- **Weekly homework** will be set. Homework activities will fall into 3 categories:
  - Quantitative questions from the textbook
  - 250 word Reading reflections on the education literature, graded according to the rubric on page 23.

- Tutorial homeworks graded according to the rubric on page 21.  
○ Homeworks graded according to the rubric on page 22.

*Full instructions will be provided each week, together with the method of assessment, in the weekly content area.*

**Homework questions will be collected in for grading at 4 different dates during the semester (roughly every 3 weeks). Homework can be delivered to to DropBox (under the DropBox tab on the top toolbar) at any time, up to the due date. Each week's homework questions will have their own DropBox folder.**

Homework that involves problem solving, pictures, or other material that is difficult to submit as a Word format or similar, may be submitted as hand written work scanned in or photographed. If you use a camera phone to take pictures of your work, a useful app is CamScanner (<https://www.camscanner.com>), which compiles multiple pictures into one document for ease of uploading. There is a free version that I encourage you to check out. Make sure that your work is legible in scanned form.

*Homeworks address: Learning Outcomes 1-5*

- **2 Projects** will be assigned throughout the semester, one after roughly 4 weeks, one after about 8 weeks. Each one will be due by the date I set the next one (giving you about **4 weeks for each one.**) **They must be submitted to DropBox (under the DropBox tab on the top toolbar).** I will give more details and instructions closer to when they are assigned. For now, I will give you an idea of what each one involves:

**Project 1:** Develop a complete lesson plan, including exercises and evaluation, introducing a topic in quantum mechanics to high school students and that is related to a modern application of quantum mechanics. Use the 5E lesson plan framework *Addresses: Learning Outcome 5*

**Project 2:** Find and critically analyze an article from the popular media which contains a misuse or misunderstanding (intentional or otherwise) of quantum theory. *Addresses: Learning Outcome 4*



## GRADING

Full completion of quizzes - (2/3)% each week	10%
Performance on Quizzes - 1% each week	15%
Discussion - 2% each week	30%
Homework - 2% each week	25%
Project 1	10%
Project 2	10%
Extra Credit (TBD)	3%

Current scores will be available for students to see in the Gradebook on LearningStudio (eCollege).

### Grading Scale:

90-100%	A
80-89.99%	B
70-79.99%	C
60-69.99%	D
<59.99%	F

## TECHNOLOGY REQUIREMENTS

- To fully participate in online courses, you will need to use a current, Flash enabled browser. For PC users, the suggested browser is Internet Explorer 9.0 or 10. For Mac users, the most current update of Firefox is suggested.
- You will need regular access to a computer with a broadband Internet connection. The minimum computer requirements are:
  - 512 MB of RAM, 1 GB or more preferred
  - Broadband connection required courses are heavily video intensive
  - Video display capable of high-color 16-bit display 1024 x 768 or higher resolution
- You must have a:
  - sound card, which is usually integrated into your desktop or laptop computer
  - speakers or headphones.

- Depending on your course, you might also need a:
  - webcam
  - microphone

For courses where interactive tools are used, like VoiceThread or Class Live Pro, headphones are suggested for use with recording and playback. We recommend a webcam with an integrated microphone, such as the Microsoft LifeCam Cinema. All devices should be installed and configured before class begins.

- Both versions of Java (32 bit and 64 bit) must be installed and up to date on your machine. Java can be downloaded at:  
<http://www.java.com/en/download/manual.jsp>
- Current anti-virus software must be installed and kept up to date.
- You will need some additional free software for enhanced web browsing. Ensure that you download the free versions of the following software:
  - Adobe Reader
  - Adobe Flash Player
- At a minimum, you must have Microsoft Office 2013, 2010, 2007 or Open Office. Microsoft Office is the standard office productivity software utilized by faculty, students, and staff. Microsoft Word is the standard word processing software, Microsoft Excel is the standard spreadsheet software, and Microsoft PowerPoint is the standard presentation software. Copying and pasting, along with attaching/uploading documents for assignment submission, will also be required. If you do not have Microsoft Office, you can check with the bookstore to see if they have any student copies.
- For additional information about system requirements, please see:  
<https://secure.ecollege.com/tamuc/index.learn?action=technical>

## **ACCESS AND NAVIGATION**

### **Pearson LearningStudio Access and Log in Information**

Note: eCollege has recently changed its name to LearningStudio.

This course will be facilitated using Pearson LearningStudio, the learning management system used by Texas A&M University Commerce. To get started with the course, go to: <http://www.tamuc.edu/myleo.aspx>.

**You will need your CWID and password to log in to the course. If you do not know your CWID or have forgotten your password, contact Technology Services at 903.468.6000 or [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu).**

It is strongly recommended that you perform a "Browser Test" prior to the start of your course. To launch a browser test, login to Pearson LearningStudio, click on the 'myCourses' tab, and then select the "Browser Test" link under Support Services.

### **Pearson LearningStudio Student Technical Support**

Texas A&M University Commerce provides students technical support in the use of Pearson LearningStudio.

Technical assistance is available 24 hours a day/ 7 days a week.

If at any time you experience technical problems (e.g., you can't log in to the course, you can't see certain material, etc.) please contact the Pearson LearningStudio Help Desk, available 24 hours a day, seven days a week.

The student help desk may be reached by the following means 24 hours a day, seven days a week.

- **Chat Support:** Click on '*Live Support*' on the tool bar within your course to chat with an Pearson LearningStudio Representative.
- **Phone:** 1-866-656-5511 (Toll Free) to speak with Pearson LearningStudio Technical Support Representative.
- **Email:** [helpdesk@online.tamuc.org](mailto:helpdesk@online.tamuc.org) to initiate a support request with Pearson LearningStudio Technical Support Representative.

**Accessing Help from within Your Course:** Click on the '*Tech Support*' icon on the upper left side of the screen inside the course. You will then be able to get assistance via online chat, email or by phone by calling the Help Desk number noted below.

**Note:** 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 bookstore, such as Barnes & Noble, etc.

### **Policy for Reporting Problems with Pearson LearningStudio**

Should students encounter Pearson LearningStudio based problems while submitting assignments/discussions/comments/exams, the following procedure **MUST** be followed:

1. Students must report the problem to the help desk. You may reach the helpdesk at
2. [helpdesk@online.tamuc.org](mailto:helpdesk@online.tamuc.org) or 1-866-656-5511
3. Students **MUST** file their problem with the helpdesk and obtain a helpdesk ticket number
4. Once a helpdesk ticket number is in your possession, students should email me to advise me of the problem and to provide me with the helpdesk ticket number
5. At that time, I will call the helpdesk to confirm your problem and follow up with you

**PLEASE NOTE:** Your personal computer/access problems are not a legitimate excuse for filing a ticket with the Pearson help desk. You are strongly encouraged to check for compatibility of your browser **BEFORE** the course begins and to take the Pearson LearningStudio tutorial offered for students who may require some extra assistance in navigating the Pearson LearningStudio platform. **ONLY** Pearson LearningStudio based problems are legitimate.

### **Internet Access**

An Internet connection is necessary to participate in discussions and assignments, access readings, transfer course work, and receive feedback from your professor. View the requirements as outlined in Technology Requirements above for more information.

### **myLeo Support**

Your myLeo email address is required to send and receive all student correspondence. Please email [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu) or call us at 903-468-6000 with any questions about setting up your myLeo email account. You may also access information at <https://leo.tamuc.edu>.

### **Learner Support**

Go to the following link [One Stop Shop](#)- created to serve you by attempting to provide as many resources as possible in one location.

Go to the following link [Academic Success Center](#)- focused on providing academic resources to help you achieve academic success.

## COMMUNICATION AND SUPPORT

The following is the list of communication methods used in this class and their purposes. These include student-instructor, instructor-student and student-student communication.

***You will be expected to check your university email account and log onto eCollege at least once every 24 hours Monday-Friday in order to keep abreast of the latest class announcements.***

- **Email** will be used by me to communicate to the class as a whole general information about upcoming assignments, due dates, and any changes in the schedule or syllabus that might occur.

I will also email students individually with occasional feedback from assignments and on the class as a whole.

Students can use email to ask me any questions about (i) course logistics (upcoming assignments, due dates...) (ii) as any questions about the way their specific assignments were graded and feedback they have been given (iii) constructive feedback to me about how the course is going and any problems/concerns with the course structure (and even things that work particularly well!)

In emails, please put "PHYS526 Online" in the subject header. I will reply to emails within 24 hours (48 at weekends and holidays)

I will always send emails to your official University Email address as given through MyLeo. It will be your responsibility to check your university email regularly.

- **Announcements** on LearningStudio (eCollege) will be used to communicate to the class as a whole general information about upcoming assignments, due dates, and any changes in the schedule or syllabus that might occur. New announcements will appear to you the next time you log in to LearningStudio (eCollege).
- **Discussion threads** for each week should be the main way in which you ask and debate the answer to questions you have about the course material itself. Here you can brainstorm problem solving techniques and analyses of reading material. These questions should be continually addressed by your fellow students, and by myself, although in the spirit of discussion concrete answers will only be given after an honest and sustained attempt to figure out the answers

yourselves.

- **Virtual Office** is another place to discuss questions you have about the course individually with me. As well as questions about course logistics, **if anything about the material is unclear to you and preventing you tackling the concepts in the discussion**, this is the place to ask those questions. Any questions that could be answered in the discussion thread, I will only answer here after an honest and sustained discussion on them in the thread. Like emails, I will reply to Virtual Office questions within 24 hours (48 at weekends) unless they are asked during virtual office hours, in which case I'll answer them during those hours.
- **Adobe Connect** will be available if you wish to ask questions face to face during office hours. It is essentially a more sophisticated version of Skype, and can support conversations between multiple people. It works through a web browser; I will email a link ahead of each office hours.

**Online Office Hours** will be held each Tuesday and Thursday from 6:00 p.m.-7:30 p.m. I will be active during those times on the discussion threads, **Adobe Connect** and **Virtual Office**.

- **Student Lounge** is located on the left hand menu under Course Home, and is a place to chat with fellow students about anything you like – as trivial or as deep as you like. This is a place I will NEVER visit, intended for yourselves only.

The following table summarizes where to find the communication tools used in this class:

<b>Communication tool</b>	<b>Where to find</b>
Email	Top toolbar or Leomail
Virtual Office	Left menu under "Course Home"
Weekly discussion thread	Left menu under the relevant Week tab.
Student Lounge	Left menu under "Course Home"
Announcements	New announcements appear when you log on to LearningStudio

# COURSE AND UNIVERSITY PROCEDURES/POLICIES

## Academic Honesty

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including (but not limited to) receiving a failing grade on the assignment, the possibility of failure in the course and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. In **ALL** instances, incidents of academic dishonesty will be reported to the Department Head. Please be aware academic dishonesty includes (but is not limited to) cheating, plagiarism, and collusion.

*Cheating* is defined as:

- Copying another's test or assignment.
- Communication with another during an exam or assignment (i.e. written, oral or otherwise).
- Giving or seeking aid from another when not permitted by the instructor.
- Possessing or using unauthorized materials during the test.
- Buying, using, stealing, transporting, or soliciting a test, draft of a test, or answer key.

*Plagiarism* is defined as:

- Using someone else's work in your assignment without appropriate acknowledgement.
- Making slight variations in the language and then failing to give credit to the source.

*Collusion* is defined as:

- Collaborating with another, without authorization, when preparing an assignment.

If you have any questions regarding academic dishonesty, ask. Otherwise, I will assume that you have full knowledge of the academic dishonesty policy and agree to the conditions as set forth in this syllabus. **Homework and discussion posts will be randomly tested for plagiarism.**

## **Attendance Policy**

In an online class, attendance means active participation; students are expected to spend at least 2 hours/week on the discussion threads and at least 10 hours/week is required to complete all the assignments, including reading. At least five substantive discussion posts are required by each student each week to gain full points on the discussion part of the grade. If you are unable to log on for an extended period of time (greater than a week) then contact me *in advance* to discuss how to proceed. We recognize that many of you already have a busy work schedule, and that occasionally you might get behind during a week. Spending even 15-30 minutes a day on class material and the discussion threads will help greatly, and ***if you find yourself struggling at any time, please do not hesitate emailing me; I can be flexible to accommodate your busy schedule.***

## **Assignment policy**

Students will be responsible for knowing when due dates for homeworks, quizzes and projects are by reading the syllabus, looking at the schedules under "Course Home" and in this syllabus, and reading the relevant sections when posted on eCollege. If the schedule changes, you will receive an email and an announcement on eCollege about it.

## **Late work**

Late homeworks will be penalized by 10% by each day they are late (i.e. a Homework submitted more than 10 days late gets no credit). Late projects (except the last one, which is due by the last day of classes) will be penalized by 10% by each day they are late. Quizzes and discussion posts will not be accepted past the due date.

## **Netiquette: Communication Courtesy Code**

Students are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. 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 following links concerning "netiquette". <http://www.albion.com/netiquette/>  
<http://www2.nau.edu/d-elearn/support/tutorials/discrubicricts/netiquette.php>

## **Discrimination statement**

A&M-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.



## **ADA Statement: Students with Disabilities**

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 Resources and Services  
Texas A&M University-Commerce  
Gee Library- Room 132  
Phone (903) 886-5150 or (903) 886-5835  
Fax (903) 468-8148  
[StudentDisabilityServices@tamuc.edu](mailto:StudentDisabilityServices@tamuc.edu)

## **Student Conduct**

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See *Code of Student Conduct from Student Guide Handbook*).

## **Harassment Policy**

Title IX makes it clear that 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 has been harassed or assaulted, you can find the appropriate resources here:

University Title IX Contact: Michele Vieira, 903-886-5025,  
<mailto:TitleIX@tamuc.edu>

University resource webpages:  
<http://www.tamuc.edu/facultyStaffServices/humanResources/title-ix/resources.aspx>

<http://www.tamuc.edu/campuslife/campusServices/universityPoliceDepartment/crimePrevention/sexualAssault.aspx>

University Counseling Center: 903-886-5145,  
<http://www.tamuc.edu/campusLife/campusServices/counselingCenter/default.aspx>

Campus police: <mailto:upd@tamuc.edu>, call 911 in emergency situations

External resources:

Crisis center of NorthEast Texas: <http://www.ccnetx.org>

Know you IX: <http://knowyourix.org>

End rape on campus: <http://endrapeoncampus.org>

Clery Center for Security on Campus: <http://clerycenter.org>

Not Alone: <https://www.notalone.gov>

## **Campus Concealed Carry Statement**

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorize the carrying of a concealed handgun in Texas A&M University-Commerce 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 A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

## **COURSE OUTLINE / CALENDAR**

### ***This schedule is tentative.***

The dates given in the first column are what I'm defining to be the begin and end dates of each week, from when the week's material becomes available to when the quiz and discussion posts are due.

During weeks 1-6 we will also practice some necessary background math and introduce Dirac notation. We will mostly be reading journal articles for weeks 1-6, including some primary sources.

<b>Week</b>	<b>Topic</b>	<b>Chapter/Sections (Teaching Physics to your Dog)</b>	<b>Chapter/Sections (Quantum Mechanics)</b>
1: Feb 1 – Feb 12	19 <sup>th</sup> C physics, black body radiation/Max Planck/the quantum	Chapter 1:pre-Einstein	Appendix B
2: Feb 9 – Feb 18	Einstein/Photoelectric effect	Chapter 1:Einstein	Appendix B/C
3: Feb 16 – Feb 25	The Bohr-Sommerfeld atom		Appendix C
4: Feb 23 – Mar 4	Heisenberg/Matrix mechanics, uncertainty principle	-	Appendix D
5: Mar 2 – Mar 11	Schrödinger/Wave mechanics/wavefunctions	-	Appendix D, Chapter 5
6: Mar 9 – Mar 25	The Copenhagen Interpretation/Intro to quantum states	Chapter 1	Chapter 3
7: Mar 23 – Apr 1	Quantum States/Stern-Gerlach Experiment	Chapters 2,3	Chapter 1.1,1.2
8: Mar 30 – Apr 8	Quantum States/Stern-Gerlach Experiment II/	Chapter 4	Chapter 1.3,1.4
9: Apr 6 – Apr 15	Operators/Quantum Zeno	Chapter 5	Chapter 2.1-2.3
10: Apr 13 – Apr 22	Quantum tunneling/commutation	Chapter 6	
11: Apr 20 – Apr 29	Entanglement, EPR and Bell's Theorem	Chapter 7	Chapter 4
12: Apr 27 – May 6	Feynman diagrams, QFT, the standard model	Chapter 9	-
13: May 4 – May 12	Qubits, Doping, Transistors	Chapter 10	Chapter 5, 15.10, 16.2

## WEEKLY ONLINE DISCUSSION RUBRIC

Each week your discussion posts will be graded using the following rubric. Each week's discussion posts contribute up to 2% to your final grade.

*Note:* One post counts as 100 words or more on topic. Posts with less words or posts not addressing the week's class topic will not be considered for grading. Of course, the discussion should be allowed to flow naturally, and shorter posts will naturally occur, including one word posts of the type "I agree!" and "Yes!" or "No!". This is fine, and indeed necessary – it is just that the grading will be based upon posts of 100 words or more.

A reminder that netiquette should be observed at all times: please make sure you visit and understand the following resources:

<http://www.albion.com/netiquette/>

<http://www2.nau.edu/d-elearn/support/tutorials/discrubrics/netiquette.php>

<b>Criteria</b>	<b>Unacceptable(0)</b>	<b>Poor (1)</b>	<b>Good (2)</b>	<b>Excellent (3)</b>
Number of posts	No posts during the week.	1-2 posts during the week.	3-4 posts during the week.	5 or more posts during the week.
Spelling and Grammar	Posts are not in complete sentences, or more than half of the sentences have spelling or grammatical errors.	Between a quarter and half of sentences have spelling or grammatical errors.	Less than a quarter of sentences have spelling or grammatical errors.	No spelling or grammatical errors.
Knowledge	Posts demonstrate no evidence of knowledge of the week's reading.	Posts demonstrate evidence of only a cursory reading of the week's material, and little attempt to critically analyze it.	Posts demonstrate reasonable knowledge of the week's reading, and an attempt to critically analyze it.	Posts demonstrate evidence of comprehensive knowledge of the week's reading, and significant attempts to critically analyze it.

Appropriateness and awareness of other student contributions	Posts rude/disrespectful. No attempt to build upon other students' posts or support other people's arguments.	Minimal acknowledgment of other students' posts. Little attempt to build upon arguments.	Reasonable attempts to build upon other students' posts and contribute to their arguments.	Excellent awareness of other students' posts and substantial efforts to contribute to their arguments.
References and support	Arguments are unsupported, come across as unsubstantiated opinion.	Minimal support for students' arguments. Student's thinking unclear, hard to discern how student arrived at their conclusions.	Reasonable attempt to justify arguments made, with some references to the week's reading and external sources where appropriate.	Arguments are fully backed up, with clear explanations of how the student arrived at their conclusions, with full references to the week's reading or to external sources where appropriate.

Credit: The following online rubrics have been used to inform the development of the rubric above:

<http://www.udel.edu/janet/MARC2006/rubric.html>

<http://www2.nau.edu/d-elearn/support/tutorials/discrubrics/discrubric.php>

[https://topr.online.ucf.edu/images/f/f0/IDL6543\\_Discussion\\_Rubric.pdf](https://topr.online.ucf.edu/images/f/f0/IDL6543_Discussion_Rubric.pdf)

## TUTORIAL HOMEWORK RUBRIC

Each graded item on the tutorial homework is worth 4 points total. The assignment of the 4 points is determined by the following rubric. An item is defined as an individual question/problem, involving a sketch, written explanation, qualitative or quantitative answer.

Points	2	1	0
Quality of written explanation OR sketch	The written explanation shows that the student has put in thought, and the reasoning is logical. OR The sketch shows that the student has put in thought, and the sketch is mostly correct.	The written explanation shows that the student has put in thought, but the reasoning makes little sense. OR The sketch shows that the student has put in thought, but the sketch is mostly incorrect.	Written explanation reflects minimal effort. OR Sketch reflects minimal effort.
Completeness	Response to question is complete. When a written explanation is required, complete sentences are used.	Response to question is incomplete. When a written explanation is required, complete sentences are not used. Much of the writing is unreadable, word choice is inaccurate, and errors severely impede communication.	There is no response.

## READING REFLECTION HOMEWORK RUBRIC

Each reading assignment will be accompanied by one or more writing prompts. Students should follow the directions in the prompts. Homework will be graded according to the following rubric. Note that the maximum possible score is 16 points. Scores will be converted to percentages, so that a raw score of 16 is 100%.

Points	4	3	2	1
Clarity of main points	Main points are clear and easy to comprehend.	The main points are mostly clear, but slightly difficult to comprehend.	Main points are difficult to identify, or writing is difficult to comprehend.	Writing is incomprehensible.
Detail	Writing includes many specific details that are related to the main points.	Writing includes some specific details that are related to main points.	Writing includes very few specific details, or there are many details that are unrelated to the main points.	Writing includes no specific details.
Argument	The writer connects their main points with the details they have provided and makes a coherent argument.	The writer connects some of their main points to details provided, but the argument is may not be logically clear.	The writer's arguments or justifications are difficult to follow.	The writer includes no arguments or justifications.
Relevancy	Writing is completely related to the prompt.	Writing is mostly related to the prompt but is occasionally off topic.	Writing is occasionally related to the prompt but is mostly off topic.	Writing is completely unrelated to the prompt.

## COURSE DUE DATES: DISCUSSION POSTS

Each week you must post at least **one** post in each of **three different** discussion threads, giving your initial thoughts on the subject of the thread or any conceptual or mathematical difficulties you are having with the thread subject. You must also post at least **two** follow up posts in your choice of the **previous week's** threads, responding to another person's comments, or one of my comments. That makes a total of **five** posts per week that will be graded.

Discussion threads for a particular week open at **12.01 a.m.** each **Friday** with the rest of the week's material. To receive credit for your posts, they must be made within the time-frame outlined below. The threads remain open until the end of the semester.

WEEK	DISCUSSION THREADS OPEN	3 POSTS IN 3 DIFFERENT THREADS DUE	2 FOLLOW-UP POSTS DUE
1	Feb 1	Feb 11	Feb 18
2	Feb 9	Feb 18	Feb 25
3	Feb 16	Feb 25	Mar 4
4	Feb 23	Mar 4	Mar 11
5	Mar 2	Mar 11	Mar 25
6	Mar 9	Mar 25	Apr 1
7	Mar 23	Apr 1	Apr 8
8	Mar 30	Apr 8	Apr 15
9	Apr 6	Apr 15	Apr 22
10	Apr 13	Apr 22	Apr 29
11	Apr 20	Apr 29	May 6
12	Apr 27	May 6	May 12
13	May 4	May 13	-



## COURSE DUE DATES: QUIZZES

The introductory week's **pre-course assessment** and **syllabus quiz** becomes available on **Thursday Feb 1<sup>st</sup>** at **12.01 a.m.** *For the syllabus quiz only, you may take the quiz as many times as you like. You will only gain access to week one once you have made 100% on the syllabus quiz and have completed the pre-course assessment.*

Quizzes on each week's reading material become available at **12.01 a.m.** each **Friday** along with the rest of the week's material, and close at **11.59 p.m. (midnight)** the following **Sunday, 9 days later.**

**NOTE:** *Apart from the syllabus quiz, quizzes can only be attempted once. Once you begin taking the quiz, you will have a time limit of one hour to complete it. Once completed, you cannot return to it and revise your answers.*

<b>WEEK</b>	<b>QUIZ AVAILABLE</b>	<b>QUIZ DUE</b>
1	Feb 1	Feb 11
2	Feb 9	Feb 18
3	Feb 16	Feb 25
4	Feb 23	Mar 4
5	Mar 2	Mar 11
6	Mar 9	Mar 25
7	Mar 23	Apr 1
8	Mar 30	Apr 8
9	Apr 6	Apr 15
10	Apr 13	Apr 22
11	Apr 20	Apr 29
12	Apr 27	May 6
13	May 4	May 12

## COURSE DUE DATES: HOMEWORKS

Homework for a given week becomes available with each week, on **Friday** at **12.01 a.m.** They are due at **11:59pm** on the due dates shown in the calendar below.

WEEK	HW AVAILABLE	HW DUE
1	Feb 1	Feb 25
2	Feb 9	
3	Feb 16	
4	Feb 23	Mar 25
5	Mar 2	
6	Mar 9	
7	Mar 23	Apr 15
8	Mar 30	
9	Apr 6	
10	Apr 13	May 6
11	Apr 20	
12	Apr 27	
13	-	