Computational Physics (PHYS 2321)

Fall 2015

Class time: Monday, Wednesday & Friday/10:00 AM-10:50 AM

Science Hall, Classroom 105

Instructor: Prof. Muhammad N. Huda **Phone**: 817 272 1097

Office: CPB 339 **Office Hours**: Wed./Fri. 11:00-12:00 AM, or by appointment

Email: huda@uta.edu

Web Page: https://www.uta.edu/mentis/public/#profile/profile/view/id/4687

Course Prerequisite: PHYS 1443, PHYS 1444. Basic computer literacy is needed.

Textbook: ***Computational Physics*** **(2nd edition) by N.J. Giordano and H. Nahanishi**.

(Webpage for the book's supplement: http://www.physics.purdue.edu/~hisao/book/)

We will be using FORTRAN for the class purpose; however, you may submit your project in python, C or C++, etc. if you find them convenient. **Note, package programs like Mathematica or Matlab will not be accepted.** To learn simple FORTRAN language you may consult Schaum's Outlines series "Programming with FORTRAN 77" by W. E. Mayo and M. Cwiakala.

Other useful book: *Computational Physics* by R. H. Landau, M. J. Paez and C. C. Bordeianu.

Course Descriptions: The basic computational techniques will be introduced through applications to selected physical problems. Topics such as function evaluation, data fitting, integration, differential equations, and Monte Carlo simulations will be introduced. FORTRAN computer language will be used for class instruction purpose.

First 3 to 4 weeks of class will be devoted to the basic computation introduction, such as LINUX, FORTRAN, numerical differentiation, integration etc. After this we'll start with the first chapter of the text book.

Course Learning Goals/Objectives: The goal of the course is to provide fundamental concepts and understanding in computational physics. During the course, we'll emphasize the differences in problem solving strategies between analytical and computational approaches. The course will emphasize skill development using computer programming for problems solving in physical sciences.

Attendance: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I have established following attendance policy for this class: *Attendance and engaging with the class discussion is very important for learning from this class. Hence 10% of the total grade is assigned for attendance and class quiz (if any). Please note, attendance will be taken randomly. If you foresee that you may not attend a class, please send me an email* ***before*** *the class.*

Exam dates (*tentative*):

First exam: September 30, 2015
Second exam: November 2, 2015
Final exam: December 14, 2015

You have to participate in all the exams. Second and final exam will be mainly coding base projects.

There will be no make-up exam unless there is a documented emergency!

Home work: Several computational (coding) projects will be assigned throughout the semester. Each project needs to be returned by email by 5PM on the due date.

Your email containing the HW should clearly specify (1) how to run your code, (2) A brief descriptions of how the coding is planned and (3) the code. If your code do not run or give error

message, you will not get credit for that project. In addition, each code should contain enough "comments" lines to describe what is done (e.g. what method is being used etc.) to get full credit. So it is advisable that you start working on your HW projects early to avoid such problems.

In addition, there will be traditional problem solving HW depending on the need of the course.

No late homework will be accepted.

It is important to note that for all the coding projects (either in exams or in homeworks), the total points will be divided into two parts: (i) description of the code and (ii) the actual coding. In addition, to run the code we'll be using UTA's omega server.

To avoid machine related troubles, please start doing your HW or exam project as early as possible.
Request for last minute extension due to any computing machine related problems will not be accepted.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Grading Policy

Homework & Projects: 25%.
Exam-1: 20%
Exam-2: 20%
Final Exam: 25%
Class Participation: 10% (Class participation will be defined by the attendance in class *and class quiz* (*if any*))

A: 100% to 90%; **B**: 75% to 89%; **C**: 60% to 74%; **D**: 50% to 59%; **F**: 0% to 49%

Useful links:

UTA's computing facility:	http://oit.uta.edu/
UNIX/LINUX introduction: link from above, or	http://www.uta.edu/oit/cs/unix/index.html
Fortran 77 Tutorial	http://www-teaching.physics.ox.ac.uk/Unix+Prog/hargrove/tutorial_77/
Fortran 90 Tutorial	http://www.scd.ucar.edu/tcg/consweb/Fortran90/F90Tutorial/tutorial.html

Note:

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the

instructor with official notification in the form of a letter certified by the **Office for Students with Disabilities (OSD).** Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos. For information regarding Title IX, visit* www.uta.edu/titleIX.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Lab Safety Training: Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as

scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which you will find by turning right upon exiting from this class room. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php

The English Writing Center (411LIBR): Hours are 9 am to 8 pm Mondays-Thursdays, 9 am to 3 pm Fridays and Noon to 5 pm Saturdays and Sundays. Walk In ***Quick Hits*** sessions during all open hours Mon-Thurs. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, Workshops, and advanced services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information.

Please note:

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Muhammad N. Huda.