Checked BW 9-10-13

University of North Alabama
Fall 2013

PH 343	*Modern Physics* for scientists and engineers
Credit	Four semester hours
Class Meetings	4 times per week, MWRF-8-8:50am-FSB 217
Textbook	*Modern Physics* for scientists and engineers by Stephen T. Thornton and Andrew Rex. Third Edition.
Instructor	Dr. Valeriy K. Dolmatov, Associate Professor of Physics
Office	FSB 215

Office Hours

M	1-2 pm
T	not available (engaged in research activities)
W	2-3 pm
R	9am-1pm
F	12pm-1pm

Telephone 256-765-4320; email vkdolmatov@una.edu

Course Description (4) Modern Physics. Special theory of relativity, origin of the quantum theory, the nuclear atom, Emission spectra, nuclear forces, structures, and reactions. Prerequisites: PH 252. (Fall)

Unlike topics Classical Mechanics, Modern Physics is not a subject about which anyone has natural intuition. In Modern Physics, students deal with a wholly new and radically *counterintuitive* way of thinking about both macro- and micro-world. If you get confused, do not hesitate to ask for help! Remember, all questions are good questions! The instructor will do his best to help you out.

DO's and DON'Ts: To perform well on the tests and final exam, and thus obtain a high grade in this challenging course, it is essential that you understand the physics concepts and formulae. A thoughtless grinding (memorization) will NOT do! Do *not* limit yourself merely to notes made during lectures. *Do* look the subject up in the textbook. **Read (!)** the textbook. *Do* try to reproduce all derivations, that the instructor worked in the class, by yourself! *Do* this before every next lecture! *Do* maintain a positive attitude towards the subject matter! Be advised—topics from modern physics are not a subject that can be learned the night before an exam. *Do* keep applying yourself on a daily basis to reach understanding! *Do not* miss class, *be* an active participant in the exercise activities, *do* the homework yourself, *study* diligently, and *come* to see me whenever you need help.

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Secondary Education Physics Majors:

Learning Objectives:

Candidates will:

Demonstrate knowledge of nuclear physics including matter-energy duality and reactivity. 290-3-3-.18(1)(c)1. This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of light behavior including matter-energy duality and reactivity.290-3-3-.15(1)(d)1.(xiv.) This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of quantum mechanics, space-time relationships, and special relativity. 290-3-3-.18(1)(c)2. This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of models of nuclear and subatomic structures and behavior. 290-3-3-.18(1)(c)3. This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of issues related to physics such as disposal of nuclear waste, light pollution, shielding communication systems, and weapons development. 290-3-3-.18(1)(c)5. This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of the historical development and cosmological perspectives in physics including contributions of significant figures, underrepresented groups, and evolution theories in physics.290-3-3.18(1)(c)6. This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of physics, including energy, (and) stellar evolution [partial fulfillment of 290.3.3.15(1)(b)2.(iii)] See Technical Physics I and Technical Physics II syllabi for content and assessment related to the remainder of 290.3.3.15(1)(b)2.(iii)] This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of physics and basic quantum theory. 290-3-3-.15(1)(c)2.(iii) [partial fulfillment of 290.3.3.15(1)(c)2.(iii)] See Technical Physics I and Technical Physics II syllabi for content and assessment related to the remainder of 290.3.3.15(1)(c)2.(iii)] This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of kinetic-molecular motion and atomic models. 290-3-3-.15(1)(d)1.(vi) This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of radioactivity, nuclear reactors, fission, and fusion. 290-3-3-.15(1)(d)1.(vii) This will be assessed as part of the mid-term or final exam of this course.

Demonstrate knowledge of applications of physics and engineering in society, business, industry, and health fields. 290-3-3-.15(1)(d)1.(xv) This will be assessed as part of the mid-term or final exam of this course.

Content:

Special theory of relativity, origin of the quantum theory, the nuclear atom, Emission spectra, nuclear forces, structures, and reactions 290-3-3-.14 (1)(a)4.(i) and 290-3-3-.14 (1)(a)4.(ii)

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Course Requirements:

Students will demonstrate an understanding of principles, problems and solutions through collaborative and independent work. 290-3-3-.18(1)(c)1.; 290-3-3-.18(1)(c)2.; 290-3-3-.18(1)(c)3.; 290-3-3-.18(1)(c)5.; 290-3-3-.15(1)(a)2.(ii); 290-3-3-.15(1)(c)2.(iii); 290-3-3-.15(1)(d)1.(vi); 290-3-3-.15(1)(d)1.(vii); 290-3-3-.15(1)(d)1.(xv)

Course Grading — The list of exercises, along with each exercise's contribution to the final grade, is listed below.

5 Quizzes (15 min each)…….10% (you can drop the lowest grade)
Homework……..10%
4 to 5 Intermediate Exams……55%
Comprehensive Final……..25%

The numerical grade for the semester, obtained using the percentage components listed above, will then be converted to a letter grade for the course according to the following table:

100-90%.....A
89-80%.....B
79-70%.....C
69-55%.....D
<55%.....F

Course Policies

Class Attendance

Students are expected to attend all class meetings to succeed in this class. Attendance records will be kept. The instructor's policy is to subtract one letter grade from the student's final grade when the individual has amassed (for any reason) six class meetings. *Each subsequent missed class will result in an additional decrease of the final letter grade by one letter.* Two late arrivals to class will count as one absence.

Lectures: During formal lecture, the instructor presents a monologue on the assigned subject.

Problem solving: A considerable number of class hours are planned for training the student to solve physics problems, to help the student to understand theoretical physics concepts deeper. The instructor will go over as many problems as time allows.

Quizzes: There will be about 5 fifteen minute quizzes during the semester, as scheduled, in which the student will be assigned a set of simple enough, but fundamentally important questions which may relate to any of the topics discussed to that day. A quiz will be held in the beginning of the class hour. As the quizzes contribute to the student's final grade; the students should arrive to class on time and be prepared with paper, pen, calculator, and textbook. The due date for each particular quiz will be specified well in advance during class meetings.

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Exams: There will be 4 to 5 intermediate exams during the semester, and the final exam, as scheduled. There will be no multiple choice questions on the exams. Instead, you will have to solve typically 3 to 4 problems to demonstrate your knowledge and understanding of physics concepts in combination with your ability to apply them to solve a problem. The due date for each particular exam will be specified well in advance during class meetings.

Homework: ***"You do not know anything until you have practiced"*** **[Richard Feyman, Nobel laureate in physics].** The homework will be given a very serious consideration AND will be graded. The homework must be due as scheduled or earlier. Before turning in the homework the student MUST visit me during my office hours to DEFEND his/her solution of at least one problem of MY choice from the homework assignment. If the student presents the correct solution on the paper but cannot explain how the solution has been obtained, the student fails to defend the work. Two attempts to defend the work are allowed, before the deadline. Each particular homework assignment along with the due date will be specified well in advance during class meetings.

Office Hours: Naturally, you are very much welcomed and encouraged to visit me in my office during office hours to ask any questions related to the physics course as well as to request the help in solving a problem from any particular homework assignment. Please, come!

Make-ups: Make-ups of missing activities will not be given except in extraordinary cases. Prior arrangement is required.

Academic Integrity: The instructor assumes absolutely the academic integrity of students. However, any student found cheating on an exam will be assigned a final grade of "F" for the course.

ADA Policy: It is the policy of UNA to afford equal opportunity in education to qualified students. Therefore, a student who has a disability that inhibits the student's ability to meet course requirements and who desires accommodations must contact the instructor and Developmental Services within three class meetings of the semester. The goal is to develop a timely accommodation plan and to file an Americans with Disabilities Act (ADA) Accommodation form. Course requirements will not be waived, but accommodations will be made to allow each student to meet those requirements, provided that student acts within the first three class meetings to work with the instructor to develop an accommodation plan. If the disability is identified later in the semester, a non-retroactive plan will be developed at that time.

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