PHYS 3300: Modern Physics
Course Syllabus for Fall 2020, TR 1:00-2:25 pm

Instructor: Dr. Wayne Keith: 793-3874, keith.wayne@mcm.edu
Office Hours: S 110-C: MTWRF 9-11, WR 2:30-3, and F 1-2
Web: http://www.mcm.edu/~keith.wayne
Text: *Modern Physics (6th)*, by P. Tipler and R. Llewellyn
Required: scientific calculator, paper, pencil
Prerequisites: PHYS 2520

Course Description: This is a required course for physics majors. This course is intended to introduce the student to a wide range of areas known collectively as Modern Physics. These areas include relativity theory, atomic and nuclear physics, quantum mechanics, and elementary particle physics.

Grading: 40% Homework: Assignments will be made in class and posted online. Homework will be due at the beginning of class on the date indicated. Also includes any graded activities conducted during class (quizzes, presentations, discussions, etc.)
40% exams (20% each): In-class exams.
20% Final exam: Not comprehensive, covers the final third of the course.

You will receive a during-term grade for this course by the 5th week of classes and after midterm. You can access your grades though Moodle or MyMcM. If your during-term grade is below a C-, you will receive a message from the Mindset for Success Office regarding your academic underperformance in this course. This email will contain information about several resources that can help you.

Attendance/Make up policy: Attendance is required. Make-up exams will be given for excused absences only at the discretion of the instructor. Contacting the instructor via email or phone prior to missing class for any reason is strongly encouraged, even if it is for a school sponsored event. Students are responsible for keeping up with the due dates of course material whether or not they are in class.

Classroom Rules: Students are expected to be present and on time for all class meetings. Excessive absences (more than 4 consecutive) may result in the student being dropped from the course. Ringing cell phones and other disruptions during class may result in a loss of homework points or other penalties. Tablet PC's may only be open when needed for class activities. Late homework will not be accepted without prior permission from the instructor.

 ADA Policy: If you have a documented disability that may impact your performance in this class and for which you may require accommodations, you must be registered with and provide documentation of your disability to the Disability Services Office, President Hall, 793-4880.

Final notes: Class discussion is strongly encouraged; please feel free to ask questions, during class or outside of class, about anything that is not clear. Properly preparing for class by reading the textbook and keeping up with the homework is the most important factor in doing well in this course. **Face coverings are required during class. You will receive one warning before being asked to leave the room. Repeat offenders will be dropped.**

PHYS 3300 Course Schedule

All dates are tentative and subject to change except **bold** dates.

Date	Lecture #	Tentative Topic	Reading	Homework
8/25	1	Syllabus and Relativity basics	1-1	HW1
8/27	2	Einstein's Big Idea	1-2	HW2 – Ch 1 4,9,11,15,18 20,21,25,30,34,48
9/1	3	Lorentz Transformation	1-3	
9/3	4	Spacetime & Doppler	1-4, 1-5	
9/8	5	Twins & Garage Paradoxes	1-6	
9/10	6	Quantization	3-1	HW3 – Ch 3 4, 5, 6, 8, 15, 21, 24, 31, 35, 50
9/15	7	Blackbody Radiation	3-2	
9/17	8	Photoelectric and Compton Effects	3-3, 3-4	
9/22	9	Test 1 Review		
9/24		**Test 1**		
9/29	10	Rutherford's Atomic Model	4-1, 4-2	HW4 – Ch 4 2, 4, 6, 10, 13, 16, 18, 25, 27, 36
10/1	11	The Bohr Model	4-3	
10/6	12	X-Ray Spectra	4-4	
10/8	13	Franck-Hertz	4-5	
10/13	14	Wave Properties of Particles	5-1, 5-2	HW 5 – Ch 5 1, 3, 12, 13, 17, 21, 23, 28, 38, 46
10/15	15	Wave Packets	5-3	
10/20	16	Uncertainty	5-4, 5-5	
10/22	17	Wave-Particle Duality	5-6, 5-7	
10/27	18	Test 2 Review		
10/29		**Test 2**		
11/3	19	1D Schrodinger Equation	6-1	HW6 – Ch 6 1, 6, 12, 16, 27, 31, 44, 53
11/5	20	Infinite Square Well	6-2	
11/10	21	Finite Square Well	6-3, 6-4	
11/12	22	Harmonic Oscillator / Tunneling	6-5, 6-6	
11/17	23	3D Schrodinger Equation	7-1	HW7 - Ch 7 2, 17, 20
11/19	24	Hydrogen Wave Function	7-2	
11/24	25	Pauli Exclusion Principle	7-3,4,6	
11/26		**No Class – Thanksgiving**		
12/1	26	Particle Physics		
12/3	27	Test 3 Review		
12/8		**Final Exam – Test 3 (1:00 – 3:00)**		

Course objectives and goals	Linked to which departmental program goal(s)	Linked to which institutional goal(s)?	Types of evidence used to demonstrate student achievement of objectives & goals
Students will demonstrate conceptual understanding of the basic principles of modern physics.	- to prepare physics graduates for a wide range of career opportunities including not only graduate study in physics, engineering, pre-med, or other sciences; but also, science teaching and careers in industry and science-related business	1,2,3,8	Successful completion of in-class exam essay questions.
Students will demonstrate the ability to apply various mathematical methods towards solutions of modern physics problems.	- Same as above	1,2,3,8	Successful solving of appropriate problems during in-class discussions, homework and exams.
Students will demonstrate conceptual and practical understanding of the physics behind relativity, atomic and elementary particle physics, and quantum mechanics	- Same as above	1,2,3,8	Successful completion of in-class exam essay questions and solving of appropriate problems during in-class discussions, homework and exams.