Course materials: Most materials, aside from those that students will be asked to find for themselves, will be either posted on Canvas or provided in printed form. Students will be provided laboratory notebooks.

Topics and General Information: Students in this course will conduct a variety of experiments primarily in the areas of atomic, nuclear, and solid state physics, and in the process will learn about advanced laboratory instrumentation and techniques.

Attendance: Attendance of all lectures is strongly encouraged – this is where you’ll learn important details about what is going on in the laboratory experiments. Laboratory attendance is required.

Course structure: Topics related to laboratory experiments will be covered in each week’s lectures. Students will usually work in small groups on experiments, generally for one to two weeks per experiment. Students are expected to maintain a detailed laboratory notebook, which will be checked periodically by the instructor. Experimental results and any associated data analysis for each laboratory experiment must be completed and turned in one week after the lab is completed. For four of the experiments, a full written laboratory report must be submitted, following the general format below. The full written report is due two weeks after the lab is completed. At the end of the semester, each student will give a five-minute oral presentation over the results of one experiment of their choice. There will also be a written final exam to assess your understanding of the experiments.

Grade: The grading in the course will be based on the total points earned as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory notebook</td>
<td>30%</td>
</tr>
<tr>
<td>Data analysis (10 labs)</td>
<td>25%</td>
</tr>
<tr>
<td>Laboratory reports (4 labs)</td>
<td>30%</td>
</tr>
<tr>
<td>Final presentation</td>
<td>5%</td>
</tr>
<tr>
<td>Final exam</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Standard Laboratory Report Format (due two weeks after lab experiment is completed):

I. Header or Cover Page

- Student Name
- Course (Physics 4150)
- Date
- Lab Title (e.g. Alpha Spectroscopy and dE/dx Measurements)

II. Purpose – a succinct statement of experimental objectives

III. Procedure – include a brief description of apparatus used, including schematic diagram or labelled picture(s), important instrument settings or experimental conditions, and steps followed for each measurement.
IV. Results and Analysis – present data from measurements, in tabular and graphical form if appropriate; outline any calculations performed to manipulate experimental results or to make comparisons with models; include estimates of uncertainties where appropriate. (This part must be done for all lab exercises, and is due one week after lab experiment is completed.)

V. Discussion and Conclusions – summary of findings, if experimental objectives were met, and how results compare with expectations (models)

Do not plagiarize - use your own words! This should be typeset using LaTeX (“the de facto standard for the communication and publication of scientific documents”), which is freely available; a good place to get started with it is https://www.latex-project.org.

Potential Topics for Experiments:

- Optical pumping (required)
- Muon lifetime
- Nuclear magnetic resonance (required)
- Properties of superconductors
- SQUIDs
- Laser spectroscopy
- Rutherford scattering (required)
- X-ray fluorescence
- Carrier measurements in semiconductors
- Gamma-gamma coincidence from electron-positron annihilation (required)
- Alpha spectroscopy and energy loss
- Neutron activation analysis
- Chaotic behavior in a mechanical system
- Particle-induced nuclear reaction
- Photolithography

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323.

UNT’s policy on Academic Dishonesty can be found at: http://policy.unt.edu/sites/default/files/06.003_StudentStandardsOfAcademicIntegrity_8_2017.

Drop information is available in the schedule of classes at: http://registrar.unt.edu/registration/schedule-of-classes.

The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you on-line at the end of the semester and will provide you with an opportunity to provide feedback to your course instructor. SPOT is considered to be an important part of your participation in this class. In addition to SPOT, there will be a brief in-class course survey during the last two weeks of the semester. For the Spring 2018 semester you will receive an email on April 2nd (12:01 a.m.) from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Please look for the email in your UNT email inbox. Simply click on the link and complete your survey. After logging in to the my.unt.edu portal, students can access the SPOT survey site by clicking on the SPOT icon. A list of their currently enrolled courses will appear. Students complete each course evaluation independently. During the long terms, the SPOT is open for students to complete two weeks prior to final exams. During
the Spring term, the SPOT is open for students to complete six days preceding their final exam. See SPOT Calendar for specific dates and deadlines.

The Dr. Pete Latham Experimental Physics Lab (Physics Bldg, Room 117) is dedicated to Dr. William Peters (“Pete”) Latham, Jr., (August 21, 1948 – June 11, 2016), the middle child of composer Dr. William P. Latham, Sr. and Joan Seyler Latham. As a youth living in Cedar Falls Iowa, Pete found that he excelled in and loved physics. He developed this interest by earning a Bachelor of Science in Physics and Mathematics, a Master of Science in Physics, and a Doctor of Philosophy in Physics at the University of North Texas. In addition Pete also received a Masters of Optical Sciences from the University of Arizona. Pete was grateful to have a fruitful and productive 32 year long career as an Air Force civilian research scientist at Kirkland Air Force Base where he worked on the project titled Strategic Defense Initiative (nicknamed “Star Wars”). He served as a project lead and supervisor while also conducting laser optics research. As the government transitioned research programs to technology transfer, Pete led initiatives that would utilize discoveries made with lasers in other fields. He was most proud of applying laser research to medical applications. He also became a Fellow of the Directed Energy Professional Society (DEPS) where he founded the DEPS Education Program; Fellow of the International Society for Optical Engineering; and Fellow of the Laser Institute of America. Pete was very active in sports throughout his life. He coached the Denton swim team for several years. At UNT he played on the soccer team and continued playing in Albuquerque. This led to refereeing soccer games in Albuquerque. He became an Emeritus Referee for the National Soccer League. After retirement he and his wife Terry moved to Dallas where he refereed soccer in the DFW area. He also tutored chemistry, physics and math at North Lake College, because he enjoyed giving back.