

Physics C&I Second Term

All topics are connected to Physics Nobel Prize lectures:

Day 1. January 8 <ul style="list-style-type: none"> • The problems encountered with classical physics. • The ideas of modern physics (1900-1932) • J. J. Thomson's discovery of the electron (1897) – Demo 	Instructor This will be a “model” for the student presentations. It is expected that students have read the NL by J.J. Thomson prior to coming to class.
Day 2. January 15. <ul style="list-style-type: none"> • The discovery of X-Rays (Roentgen, 1895) • The discovery of radioactivity (M. Curie, 1903) 	Students 1 and 2 Students 3 and 4
Day 3. January 22. <ul style="list-style-type: none"> • Rutherford's Gold Foil Experiment (1909) • The photoelectric effect (Einstein, Millikan, 1905- 1914) 	Students 5 and 6 Instructor
Day 4. January 29. <ul style="list-style-type: none"> • Bohr's Theory of the hydrogen atom (1913) • Millikan's Oil Drop Experiment (1910-1914) 	Instructor Students 7 and 8
Day 5, February 5. <ul style="list-style-type: none"> • Compton's experiment (1923) • De Broglie's Particle-Wave Model (1924) 	Students 9 and 10 Instructor
Day 6. February 12 <ul style="list-style-type: none"> • Discovery of the neutron (James Chadwick, 1932) • Electron diffraction (D. Thomson, 1927) 	Student 11 (with instructor) Instructor

Day 7. February 19 Today's problems in physics research: <ol style="list-style-type: none"> 1. The standard model of elementary particles 2. Dark matter 3. Dark energy 4. A theory of everything? 	Instructor and guest physicist
Day 8 February 26 Review of modern physics (questions and problems in class---in preparation of final exam)	Class work and participation
Day 9. April 4.	FINAL EXAM (25%) (Time: 2 hours).

Note: About 50-55 minutes will be allotted to each presentation.

Nobel Citations

Wilhelm Roentgen 1901

“In recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him”.

John Joseph Thomson 1906

"In recognition of the great merits of his theoretical and experimental investigations on the conduction of electricity by gases".

Ernest Rutherford (Chemistry) 1908

“For his investigation into the disintegration of the elements, and the chemistry of radioactive substances”.

Marie Curie (Chemistry) 1911

“In recognition of her services to the advancement of chemistry by the discovery of the elements of radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element”.

Albert Einstein 1921

“For his services to Theoretical Physics, and especially for his discovery of the law of the photoelectric effect.”

Niels Bohr 1922

“For his services in the investigation of the structure of atoms and of the radiation emanating from them”.

Robert Millikan 1923

“For his work on the elementary charge of electricity and on the photoelectric effect”.

Arthur Compton and Charles Wilson 1927

“For his discovery of the effect named after him”.

“For his method of making the paths of electrically charged particles visible by condensation of vapour”.

Lois de Broglie 1929

“For his discovery of the wave nature of electrons”.

James Chadwick 1935

“For the discovery of the neutron”.

Clinton Davisson and George Thomson 1936

“For their experimental discovery of the diffraction of electrons by crystals”.

Class Assignment for Modern Physics (Assignment III)

Before each presentation:

1. It is assumed that all students have read the Nobel Lecture (NL).
2. The presenter gives a brief test to check the students' understanding of the main ideas of the NL.
3. A one-two page summary of the NL should be ready for handing out to all students at the beginning of the presentation.

For each presentation, the following must be handed in:

1. A list of main ideas, experiments and concepts connected with the topic.
2. A comparison with a textbook presentation of these.
3. A number of questions, problems and at least one vignette that could be used in the classroom. Relate these to the Manitoba physics curriculum.
4. One or two relevant articles from *The Physics Teacher* (American) or *Physics Education* (British) for further reading.
The journal *Science & Education* is also a good source.
(These are online and can be downloaded).
These should be photocopied and given to each student.