



# THE OHIO STATE UNIVERSITY

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## **Vintage Chemistry and Physics: Historically Accurate Reproductions of Notable Scientific Experiments**

Freshman Seminar, Autumn 2016  
ASC 1137.XX, Section TBD (one credit hour)  
Day, Time, Location TBD

### **INSTRUCTORS**

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### **COURSE DESCRIPTION**

Galileo first pointed a telescope skyward in 1609, making observations that challenged the generally accepted belief that planet Earth was the center of the universe. Have you ever stopped to consider, though, the simplicity of a telescope that could be constructed in 1609? And how such a seemingly crude telescope could redefine our understanding of the universe? This course will explore Galileo's achievements and other notable scientific experiments that produced revolutionary, even controversial, results that changed the course of history. Students will also carry out historically accurate reproductions of five notable experiments, including construction of a Galilean telescope. Students will visit the University Archives and/or University Libraries to view holdings relevant to notable scientific achievements that occurred at OSU. Historically accurate conference-style presentations of the five notable experiments will conclude the course.

### **COURSE OBJECTIVES**

- Identify several ground-breaking experiments in the history of chemistry and physics, key figures involved, and where and when the experiments were completed.
- Summarize and provide context to the importance of these ground-breaking experiments in the history not only of chemistry and physics but also in the history of society.
- Reproduce five experiments in chemistry and physics in a historically accurate manner.
- Present the results of seminal experiments in a historically accurate manner.



## REQUIRED MATERIALS AND READINGS

**Laboratory:** Students are required to obtain a laboratory notebook for use during laboratory sessions. Composition books are satisfactory. All laboratory equipment, consumables, and safety equipment will be provided by the instructors.

**Lecture:** All required readings will be provided by the instructors, will be accessible through holdings at University Libraries, or will be accessible online free of charge. Students will not be expected to master technical content, nor are readings expected to be time consuming. Readings are designed to provide context regarding the communication of science in the relevant time periods. Examples of relevant reading are provided below, however this list is not exhaustive.

### *Provided by instructors:*

- A Course in General Chemistry, William McPherson and William Edwards Henderson
- CRC Handbook of Chemistry and Physics

### *Available at University Libraries:*

- J.J. Thomson and the discovery of the electron, Davis, Thomson, Falconer, 1997, *on reserve*, selections will be read.
- Recollections and reflections, JJ Thomson, 1937, *on reserve*, selections will be read.

### *Accessible online:*

- Starry Messenger (original): <http://www.rarebookroom.org/Control/galsid/index.html>
- Starry Messenger (translated): <https://archive.org/details/siderealmessenge80gali>
- Traité élémentaire de chimie (translated): <https://archive.org/details/b21357390>
- *Découverte d'un nouveau principe végétal dans les Asperges (asparagus sativus)* (original): <http://gallica.bnf.fr/ark:/12148/bpt6k65737473/f92.item> (page 88)
- Wisniak, Jaime. *Pierre-Jean Robiquet*, Educación Química, 2013, 24, 139-149.
- The Rosalind Franklin Papers, <https://profiles.nlm.nih.gov/ps/retrieve/Narrative/KR/p-nid/187/p-docs/true>



## COURSE POLICIES

**Lecture.** Students are expected to attend all lecture periods. Students must complete all readings and written assignments as dictated by the instructors and are expected to actively participate in lecture discussions. Students will contribute relevant historical artifacts and actively engage in reading-based dialogue on Carmen discussion boards. Students will be afforded two excused absences with sufficient documentation from a medical professional, preapproved university conflicts, and other conflicts at the discretion of the instructors.

**Laboratory.** All students will carry out five historically important experiments in a laboratory setting. Laboratory periods will last for 55 minutes and attendance at all laboratory periods is required. Students are required to keep a laboratory notebook containing details about the experiments. Students will complete and submit a one-page laboratory report at the conclusion of each laboratory period. Students are required to follow all safety policies and procedures as outlined by the instructors.

**Field Trip.** Students will visit the University Archives and/or University Libraries to view holdings relevant to notable scientific achievements that occurred at OSU. Details to be determined at a later date.

**Solvay Conference.** Solvay Conferences in Chemistry and Physics, organized by Ernest Solvay, began in 1911 as invitation-only meeting places for some of the brightest chemists and physicists of the time. Solvay Conferences were and continue to be exclusive and held in high regard. As part of this course, groups of 3-4 students will give 10-15 minute oral presentations at a mock Solvay Conference on Chemistry and Physics. The Solvay Conference will take place in class during Week 15 and Week 16 and there will be a total of five presentations, one for each experiment carried out by the students in the laboratory. Each presentation will simulate a historically accurate conference talk given during the relevant time period (for example, use of PowerPoint will not be permitted). Each presentation will consist of an introduction that sets the historical context, description of relevant instrumentation, methods used, and data collected, and finally a discussion of experimental results and historical impact. Students will be evaluated as a group on the clarity of the presentation and the ability to effectively communicate the historical impact of the experiment. Students will work collaboratively to develop a detailed grading rubric to be used by the instructors in the evaluation of the conference presentations.



## **GRADING**

Participation: 50%

Laboratory: 25%

Presentation: 25 %

Final course grades will be assigned according to the following grading scale.

<b>Final Letter Grade</b>	<b>Percentage of Total Points Earned</b>
A	93 – 100%
A-	90 – 92.9%
B+	87 – 89.9%
B	83 – 86.9%
B-	80 – 82.9%
C+	77 – 79.9%
C	73 – 76.9%
C-	70 – 72.9%
D+	67 – 69.9%
D	60 – 66.9%
E	< 60%

Laboratory experiments are a key component of the course, therefore final course grades will be reduced by one grade for each laboratory period that is missed. (For example, if a student earns an A- in the course overall but missed one laboratory experiment, the student's final course grade will be reduced to a B+.)



## WEEKLY SCHEDULE

	Lecture/Lab (location)	Topic	Reading
Week 1: Aug 23 <sup>a</sup>	Lecture (room TBD)	Introduction	N/A
Week 2: Aug 29	Lecture (room TBD)	Galileo: the Galilean telescope (1609)	Sidereus Nuncius
Week 3: Sept 5 <sup>b</sup>	Lab (room TBD)	Galileo: the Galilean telescope (1609)	Sidereus Nuncius
Week 4: Sept 12	Lecture (room TBD)	Lavoisier: oxygen theory of combustion (1772)	Traité élémentaire de chimie
Week 5: Sept 19	Lab (room TBD)	Lavoisier: oxygen theory of combustion (1772)	Traité élémentaire de chimie
Week 6: Sept 26	Lecture (room TBD)	Vauquelin and Robiquet: discovery of asparagine (1806)	Pierre-Jean Robiquet
Week 7: Oct 3	Lab (room TBD)	Vauquelin and Robiquet: discovery of asparagine (1806)	Pierre-Jean Robiquet
Week 8: Oct 10 <sup>γ</sup>	Lecture (room TBD)	Thomson: mass-to-charge ratio of cathode rays (1897)	Recollections and reflections
Week 9: Oct 17	Lab (room TBD)	Thomson: mass-to-charge ratio of cathode rays (1897)	Recollections and reflections
Week 10: Oct 24	Field Trip: University Archives	TBD	TBD
Week 11: Oct 31	Lecture (room TBD)	Solvay Conferences and Halloween	TBD
Week 12: Nov 7 <sup>δ</sup>	Lecture (room TBD)	Franklin: X-ray diffraction and the DNA double helix (1953)	The Rosalind Franklin Papers
Week 13: Nov 14	Lab (room TBD)	Franklin: X-ray diffraction and the DNA double helix (1953)	The Rosalind Franklin Papers
Week 14: Nov 21 <sup>ε</sup>	N/A	N/A	N/A
Week 15: Nov 28	Lecture (room TBD)	Solvay Conference on Chemistry and Physics: Historic Experiments	N/A
Week 16: Dec 5 <sup>ζ</sup>	Lecture (room TBD)	Solvay Conference on Chemistry and Physics: Historic Experiments	N/A

<sup>a</sup> First day of classes: August 23<sup>rd</sup>, 2016 (Tu)

<sup>b</sup> Labor Day (no classes): September 5<sup>th</sup>, 2016 (M)

<sup>γ</sup> Autumn Break (no classes): October 13<sup>th</sup> and 14<sup>th</sup>, 2016 (ThF)

<sup>δ</sup> Veterans' Day (no classes): November 11<sup>th</sup>, 2016 (F)

<sup>ε</sup> Thanksgiving Break and Columbus Day (observed) (no classes): November 23<sup>rd</sup> to 25<sup>th</sup> (MWF)

<sup>ζ</sup> Last day of classes: December 6<sup>th</sup>, 2016 (W)



## **STUDENTS WITH DISABILITIES**

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.

## **ACADEMIC INTEGRITY (ACADEMIC MISCONDUCT)**

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.