

HUM-402

**Experimental history of science I**

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Cursus	Sem.	Type
Humanities and Social Sciences	MA1	Obl.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	During the semester
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Project	1 weekly
<b>Number of positions</b>	<b>30</b>

**Remark**

Une seule inscription à un cours SHS+MGT autorisée. En cas d'inscriptions multiples elles seront toutes supprimées sans notification.

**Summary**

This course will introduce students to recent works and advancements in the history of science which will provide them with the necessary background to articulate historical questions and to understand the role played by material objects and tacit, technical skills in the production of knowledge.

**Content****Learning by doing: Exploring the history of science through experimenting and making**

In the past two decades, historians have shown that the history of science is not only about texts, big ideas, and theories. To understand how tangible objects are crafted and used, historians also have to get their hands dirty. These advances in the field of history allow us to reimagine the classroom as a *laboratory* engaged in the production of historical knowledge. In this course students will be able to use their technical skills (from chemistry, physics, engineering, architecture etc.) to engage with past objects, practices, and techniques. Student projects can include:

1. the reenactment of past knowledge creation: experiments (early physics, psychology, or even alchemy), observations, drawings etc.;
2. the use of modern analysis techniques (3D scans, 3D printing, X-ray, CAD, etc.) to produce historical knowledge about past objects and practices.

**Past Projects**

Past projects have included: the measurement of the radius of the Earth (using the methods of Eratosthenes and Al-Biruni), the chemical reconstruction of the perfumes of Julius Caesar and Henry VIII, the making of a camera obscura for drawing scientific images, the reconstruction of Franklin's electricity experiments with Leyden Jars, the 3D modelling of a 14th-century astronomical clock.

**Plan**

Week 1. Introduction

*Part 1. Making Sense of Experiments*

Week 2. Experimentum Crucis: Newton's prisms & Joule's laboratory. Discussion.

Week 3. Laboratory Work: Visit to the Archives.

*Part 2. Making Sense of Instructions*

Week 4. 'Reworking the Bench': Alchemical practices and lab notebooks. Discussion.

Week 5. Laboratory Work: Deciphering alchemical instructions.

*Part 3. Making Sense of Materials*

Week 6. Matter, Materials, Materiality. Discussion.

Week 7. Laboratory Work: Recreating Newton's alchemical experiments.

*Part 4. Making Sense of Drawings*

Week 8. Deciphering Technical Drawings. Leonardo's Robots. Discussion.

Week 9. Laboratory Work: Interpreting and making drawings.

*Part 5. Making Sense of Instruments*

Week 10. Through the Looking Glass. Discussion.

Week 11. Laboratory Work: Practical work with scientific instruments.

*Part 6. Making Sense of Actors*

Week 12. Social Interactions and the Performance of Science. Discussion.

Week 13. Laboratory Work: Project workshop.

Week 14. Presentation of Project Proposals

## Keywords

re-enactment, past experiments, learning by doing, history of science, practices, artefacts, tacit knowledge

### **POLY-perspective :**

- creative perspective
- interdisciplinary perspective

<https://www.epfl.ch/schools/cdh/cdhs-vision/>

## Learning Outcomes

By the end of the course, the student must be able to:

- Identify important research questions in the history of science.
- Formulate a problematic and hypothesis.
- Analyze historical sources.
- Interpret historical artefacts.
- Assess / Evaluate the tacit and technical skills involved in the production of knowledge.
- Critique historical accounts and their own scientific skills and practice.
- Construct an argument

## Transversal skills

- Communicate effectively with professionals from other disciplines.
- Assess progress against the plan, and adapt the plan as appropriate.
- Access and evaluate appropriate sources of information.

## Teaching methods

The course relies on the teaching method of “learning by doing”. We consider this to be a particularly appropriate method for imparting knowledge about the history of science.

Fall semester: lecture, discussion, presentation and practical work.

## Expected student activities

Students are expected to attend lectures and laboratory, read the assigned articles, and participate actively to discussions. Students will prepare short reports or presentations based on their historical laboratory work. At the end of the Fall semester students will present a written proposal for the Spring semester project.

## Assessment methods

Independent evaluation at the end of both the autumn and spring term (grade associated to 3 ECTS).

Autumn term:

- Discussion (30%)
- Lab Reports and presentations (40%)
- Project Proposal (30%)

All work can be presented in either English or French.

### Supervision

Office hours	Yes
Assistants	No
Forum	Yes
Others	Weekly meetings with supervisor or during alternative appointments with supervisor and own group. If appropriate, exchange via email, to be confirmed with respective supervisor.

### Resources

#### Bibliography

Research articles, depend on the project to be performed. Information and skills to find the literature in the course of the autumn term. Additional bibliographical references will be put online on the Moodle of the course.

- Long, Pamela O. *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600*. Corvallis: Oregon State University Press, 2011.
- Polanyi, Michael. *The Tacit Dimension*. Chicago: University of Chicago Press, 2009.
- Fors, Hjalmar, Lawrence H. Principe, and H. Otto Sibum. "From the Library to the Laboratory and Back Again: Experiment as a Tool for Historians of Science." *Ambix*, 63(2):85-97, 2016.
- Smith, Pamela H., Amy R. W. Meyers, and Harold J. Cook, eds. *Ways of Making and Knowing: The Material Culture of Empirical Knowledge*. Ann Arbor: University of Michigan Press, 2014.

#### Ressources en bibliothèque

- [Polanyi, Michael. The Tacit Dimension](#)
- [Long, Pamela O. Artisan/Practitioners and the Rise of the New Sciences, 1400-1600](#)
- [Smith, Pamela H., Amy R. W. Meyers, and Harold J. Cook, eds. Ways of Making and Knowing: The Material Culture of Empirical Knowledge](#)

#### Moodle Link

- <https://moodle.epfl.ch/course/view.php?id=16381>

#### Videos

- <https://tube.switch.ch/channels/97089173>

#### Prerequisite for

HUM-466: Experimental history of science II