INTRODUCTION TO THE HISTORY OF SCIENCE

(HSTC 1200/HSTC 2200/SCIE 2000/HIST 2074)
FALL 2018/ WINTER 2019
(6 CREDIT HOURS)

LECTURES: MON/WED 2:35 - 3:25PM
ALUMNI HALL, KING'S NEW ACADEMIC BUILDING

TUTORIALS: WED 3:35-4:25 PM OR FRI 2:35-3:25 PM

General Description

Science is an inescapably pervasive aspect of our lives today. It is both a body of knowledge about the world and a set of methods for obtaining that knowledge. This course critically explores the nature and significance of science through a broad survey of its central figures, discoveries, instruments, and theories, from ancient Babylonia to the contemporary world.

While moving through the history we will explore resonances between the past and the present, as certain reemerging questions are as much alive today as they were centuries ago. This will include questions about: (1) our fundamental concepts of time, space, and life, (2) *what* and *who* is science *for* (3) the relationship between science and others forms of knowledge and beliefs, (4) the relation between scientific development and the state, (5) how instruments and techniques have guided scientific development, and (5) how has science been shaped by global networks—through the circulation of peoples, goods and ideas.

There are no prerequisite for this course.

COURSE OBJECTIVES

1. Students will develop a historical sensibility about scientific knowledge and ways of knowing. They will be challenged to appreciate something of the "otherness" of past epochs: past senses of what the world is and past ways of knowing it.
2. Students will be challenged to address their own assumptions about the nature and place of science in society, past and present.
3. Students will have the opportunity to improve their writing through two short term papers, their oral skills through tutorial discussion, and their capacities for critical textual analysis by reading a broad range texts belonging to the history of science

INSTRUCTORS

Dr. Mélanie Frappier (melanie.frappier@ukings.ca) ; 902-422-1271
Dr. Gordon McOuat (gmcouat@dal.ca); 902-422-1271

TEACHING ASSISTANTS

Rebecca Davies Wilson (rebecca.davies.wilson@dal.ca)
Luke Franklin (luke.franklin@ukings.ca)

OFFICE HOURS

Frappier: Fall: Mon. 12:30-2:30 pm)
A&A Building, King's, rm: 131 (1st floor, by the Chaplain's Office)

McOuat: Winter: TBA
King's Link (opposite the King's Student Union Office)

Rebecca Davies Wilson: Fall: Tuesdays 2:30-3:30 pm; Winter TBA
King's Link (opposite the King's Student Union Office)

Luke Franklin: Fall: Mondays: 4:00-5:00 p.m; Winter TBA
King's Link (opposite the King's Student Union Office)

Meetings with instructors and TAs are also available by appointments.

BRIGHTSPACE WEBSITE

https://dal.brightspace.com/d2l/home/77660

Students are responsible for downloading course material to ensure they have access to it at all times, including during internet outage, website maintenance periods, etc.

TEXTS

Required Online weekly readings on Brightspace course page.

Books for the Winter semester (available at King's Co-op Bookstore (basement of Academic Building):

1) Joseph Carroll, ed. *Darwin: On the Origin of Species*. (Peterborough: Broadview Press, 2003)
2) Watson, James, *The Double Helix: Text, Commentary, Reviews* (New York: W.W. Norton, 1980)
3) Barbara L. Cline, *Men Who Made a New Physics* (Chicago: University of Chicago Press, 1987)

COURSE FORMAT

Readings This course places a heavy emphasis on engaging with primary texts. You are responsible for *all* the assigned readings. 'Supplementary' readings put the primary texts in contexts. They remain optional.

Lectures Lectures will provide historical and interpretative background to the primary texts and will set them in the context of the course as a whole.

Lectures may from time to time be recorded. Please consult the instructor if this is an issue for you. Students are not allowed to record lectures or tutorials without permission of the instructor.

Tutorials The aim of the tutorials is to deepen the students' understanding of the course material and debate the material examined in lecture. Attendance is mandatory. A participation grade will be assigned for each term (5%), based on attendance *and* contribution to tutorial and class discussions.

EVALUATION

Term 1 Test 1: 10% (Date: October 10)
Short Paper 1: 10% (Due: November 7)
End-of-term Exam: 20% (Exam Period)
Participation: 5% (Ongoing)

Term 2 Test 2: 15% (Date: In Tutorial of February 13/15)
Short Paper 2: 15% (Due: 4:00pm Monday, February 25)
End-of-term Exam: 20% (Exam Period)
Participation: 5% (Ongoing)

Tests and Exams Tests (1 hr) and exams (3 hrs) will be based on *all* readings and *everything* covered in lectures and tutorials. Tests will be held during regular lecture time (1st term) or tutorial time (2nd term), exams during the exam periods.

Short Papers Each short essay will focus on a close reading of primary sources and will answer one question chosen from a series of provided questions covering the course material.
NOTE: students enrolled in HSTC 1200 will have a word length requirement for both papers of 1200-1500 words. Students enrolled in HSTC 2200, SCIE 2000, or HIST 2074 will have world length requirements for both papers of 1500-2000 words.

Letter grade scale and Definitons See https://www.dal.ca/campus_life/academic-support/grades-and-student-records/grade-scale-and-definitions.html

Students' responsibility with respect to evaluations It is the student's responsibility to keep his or her assignments and evaluations to protect themselves against possible lost grades or in case of grade revision (the original marked copy of the assignment will be required in such a case). Students are also encouraged to keep a copy of the drafts of their written assignments.

Grade revision Questions about grades should be first directed to the instructors. Disputes over academic performance and assessment will be dealt with according to the Academic Regulations of University of King's College. For more information, see the King's calendar: https://ukings.ca/wp-content/uploads/2018/06/20180612AcademicCalendar18-19.pdf

ASSIGNMENT SUBMISSION AND MISSED EVALUATIONS POLICIES

Essays Essays must be submitted to Sharon Brown in the HSTC office, third floor, King's New Academic Building by 4:00pm on the day they are due. Essays submitted after the office closes will be considered as having been submitted on the next working day.

Essays must also be submitted online to **Urkund** (a tool for plagiarism control) through the Brightspace course website. If you prefer that we use an alternative method of attesting to the authenticity of your work, please inform us of your decision no later than two weeks after the first lecture.

Declaration of Absence Extensions and exemptions associated with a short-term absence (less than three days) should be requested using the Student Declaration of Absence through the course Brightspace page. The form can only be submitted twice a semester and **does not provide an automatic exemption from any academic requirements missed or late during the absence.**

Contact the instructor by email as soon as possible if your conditions require a long-term absence to discuss possible alternate academic requirement arrangements.

Late submissions Late essays will be penalized 5% per day (including weekends) up to a maximum of seven days, after which they will not be accepted without a valid excuse and will receive a zero. The penalty will be applied to the grade an essay receives: if an essay receives an initial grade of 85%, but is two days late, 10% will be deducted and it will receive a final penalized grade of 75%. Extensions are only possible in special circumstances (exceptional medical or family crises) and should be requested before the due date. Appropriate supporting documentation may be required for extensions to be granted. Student declaration of absence can be used for essays.

Missed tests and exams Rescheduling of tests will be possible in special circumstances (exceptional medical or family crises, religions holidays, etc.). Appropriate supporting documentation may be required for extensions to be granted as dictated by Dalhousie's Student Absence policy.

Absence from tutorials If prolonged absence from tutorials in unavoidable, students must agree with their tutorial instructor on work to be completed in replacement of their tutorial participation.

LEARNING AND SUPPORT RESOURCES

Study Skills and Tutoring https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Writing Center If you need extra help with your writing, you can contact the Writing Centre in the Killam Library (https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html). A Study Skills Programme is offered by Academic Support (Killam Library: 494-3077).

Advising King's Academic Advising: https://ukings.ca/campus-community/student-services/academic-services/academic-advising/

Dalhousie Academic Advising : https://www.dal.ca/campus_life/academic-support/advising.html

Indigenous Student Centre https://www.dal.ca/campus_life/communities/indigenous.html

Black Student Advising https://www.dal.ca/campus_life/communities/black-student-advising.html

Libraries King's library: https://ukings.ca/campus-community/library/
Dalhousie libraries: http://libraries.dal.ca

Fair Dealing Guidelines https://libraries.dal.ca/services/copyright-office/guidelines/fair-dealing-guidelines.html

UNIVERSITY STATEMENTS

This course is governed by the academic rules and regulations set forth in the University of King's College Calendar: https://ukings.ca/wp-content/uploads/2018/06/20180612AcademicCalendar18-19.pdf

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Academic Integrity

At the University of King's College and Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student you are required to demonstrate these values in all of the work you do. Dalhousie University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity

For more information, visit https://www.dal.ca/dept/university_secretariat/academic-integrity.html.

Academic integrity issues involving King's courses are normally dealt with by the Academic Integrity Officer (AIO) of the University of King's College.

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for stude nt accessibility and accommodation for the University of King's College and Dalhousie
University. The advising team works with students who request accommodation as a result of: a disability, religious obligation, or any barrier related to any other charact eristic protected under Human Rights legislation (NS, NB, PEI, NFLD). (read more : https://www.dal.ca/campus_life/academic-support/accessibility.html)

Student Code of Conduct

Everyone at King's and Dalhousie is expected to treat others with dignity and respect. *Two* Codes of Conduct are relevant to students enrolled in Joint Dalhousie/King's classes:

1) The University of King's College Code of Conduct as contained in the Yellow Book (read more: http://policies.ukings.ca/wp-content/uploads/2017/01/YellowBook.pdf)
2) The Code of Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. (Read more: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/student-life-policies/code-of-student-conduct.html)

Diversity and Inclusion – Culture of Respect

The University of King's College is committed to a welcoming and respectful working and learning environment that is free from harassment and discrimination. We encourage open dialogue, however members of the class are expected to refrain from speaking or behaving in ways that are harmful to others, through racism, homophobia, sexism, or other derogatory treatment based on characteristics protected under the Nova Scotia Human Rights Act. The King's College Code of Conduct (*Yellow* Book) provides specifics. Students are also directed to Dalhousie's Strategy on Diversity and Inclusiveness: http://www.dal.ca/cultureofrespect.html. The full list of characteristics protected under the Nova Scotia Human Rights Act can be found here: https://www.dal.ca/dept/university_secretariat/policies/human-rights---equity/prohibited-discrimination-.html. Please do not hesitate to speak with us if you have questions or concerns.

TENTATIVE READING LIST
FALL 2018 TERM

Wed Sep 5	**Introduction** Reading: The syllabus!
Mon Sep 10	**Reading the Signs: Babylonian Omens** (Guest speaker: Dr. Kyle Fraser) Readings: Babylonian omens
Wed Sep 12	**Planetarium** Group 1: 2:30-3:30 Group 2: 3:30-4:30 Readings: Prosper *et al.* (2011). "Returning to Netukulimk"(selections); The story of Muin (online video) *Take the chance to get ahead of the readings for the next two weeks which are extensive.*
Sep12/14	**Planetarium** Group 3: 2:30-3:30
Mon Sep 17	**Heaven and Earth** Readings: Sima Tan (d. 110 BCE) "On the Six Lineages of Thought", selections from *Luxuriant Gems of the Spring and Autumn Annals* (*Chunqiu Fanlu*) attributed to Dong Zhongshu and selections from the *Classic of Changes* (*Yijing*)
Wed Sep 19	**Hippocratic Medicine** Reading: selection from Hippocrates, *Sacred Disease* Supplementary: G.E.R. Lloyd. 1979. *Magic, Reason and Experience*, Chap. 1 [On reserve]
Sep19/21	**Tutorial 1**
Mon Sep 24	**Ideas and Causes: Plato and Aristotle** Readings: Plato, *Phaedo* (selection) and Aristotle, *Physics* (selections), and *Parts of Animals* (selection). Supplementary: D.C. Lindberg. 2008. *The Beginnings of Western Science*, Chap. 3 [On reserve]
Wed Sep 26	**The Hellenistic World** Reading: selection from Ptolemy, *Syntaxis* Supplementary: D.C. Lindberg. 2008. *The Beginnings of Western Science*, Chap.5 [On reserve]
Sep 26/28	**Tutorial 2**
Mon Oct 1	**The House of Wisdom – The rise of Arabic science** (Guest speaker: Dr. Colin Mitchell, Dept. History) Reading: Habash, *The Book of Bodies and Distances*; As-Safadi (1305) *al-Ghaith al-musajjam*; Hunain ibn Ishaq on his Galen translations (selections). Supplementary: D.C. Lindberg. 2008.*The Beginnings of Western Science*,

Chap. 8 [On reserve]

Wed Oct 3	**Mathematics to Machines** Readings: Selections from al-Khwārizmī, *Hindu Reckoning* and *Compendium on Calculation by Completion and Reduction*; al-Uqlīdisī on Hindu arithmetic; Kūshyār ibn Labbān, *Principles of Hindu Reckoning;* al-Jazari ibn al-Razzaz. *The Book of Knowledge of Ingenious Mechanical Devices*. Supplementary: Nadarajan. "Islamic Automation" http://www.muslimheritage.com/article/islamic-automation-al-jazari%E2%80%99s-book-knowledge-ingenious-mechanical-devices
Oct 3/5	**Tutorial 3**
Mon Oct 8	**Holiday – Thanksgiving (No lecture)**
Wed Oct 10	**Test 1**
Oct 10/12	No tutorial

SECTION B: STRANGE FACTS, NEW ORDERS

Mon Oct 15	**Plows and Mills: the European Middle Ages** Reading: Aelfric. *Colloquy.* http://www.kentarchaeology.ac/authors/016.pdf Supplementary: R. Friedel. 2010. *A Culture of Improvement*. Chap. 2 and 3 [On reserve]
Wed Oct 17	**Astrolabe** Guest speaker: Dr. Samuel Gessner (Lisbon) on the Astrolabe Reading: Ted Wujec (2009). "Learn to Use the 13th-century astrolabe"
Oct 17/19	**Tutorial 4**
Mon Oct 22	**A World Without Women: Universities and Late Medieval Scholastic Philosophy** Readings: Giles of Rome. "That a Woman Can Be Impregnated without the Emission of her own Sperm" and Jacopo da Forli "On the generation of embryos" Supplementary: D.C. Lindberg. 2008. *The Beginnings of Western Science*, Chap. 9 and 13 [On reserve]
Wed Oct 24	**The Age of Discovery** Readings: Amerigo Vespucci (1497) "Letter to Pier Soderini," (selections), Seydi Ali Reis (1557) *Mirat ul Memalik (The Mirror of Countries)* (selections); Ma Huan (1433) *Ying-Yai Sheng-Lan (The Overall Survey of the Ocean's Shores)* (selections).
Oct 24/26	**Tutorial 5**

Mon Oct 29	**Renaissance: Macrocosm and microcosm** Guest lecturer: *Rebecca Davies Wilson* Readings: Paracelsus. "Alchemy: The Third Column of Medicine" and Alderotti, "How to make aqua vita"
Wed Oct 31	**Renaissance: The Copernican Revolution** Reading: selections from Copernicus (1543) *On the Revolutions of the Heavenly Spheres*; selection from Galileo (1610) *The Starry Messenger*.
Oct 31/Nov 2	**Tutorial 6**
Mon Nov 5	**Are we machines with souls?** Reading: selection from Descartes, *Discourse on the Method* (selection) and *The World* (selection).
Mon Nov 7	**Encounters** SHORT PAPER 1 DUE! (Guest lecturer: Dr. Simon Kow) Reading: Zhuxi, Principle & Material-Force; Selections from the journals of Matteo Ricci (you are responsible for pp. 26-32)
Nov 7/9	No tutorial
Nov 12-16	**Fall Study Break !**

SECTION C: ENLIGHTENMENT: DARE TO KNOW!

Mon Nov 19	**The Rise of Experimental Philosophy** (Guest lecturer: Dr. Kathryn Morris) Sprat (1667). *The History of the Royal Society* (selections)
Wed Nov 21	**Isaac Newton: Mathematical-experimental science and the new physics** (Guest lecturer: Dr. Stephen Snobelen) Reading: Newton's 'Letter to Oldenburg, February 6, 1672', selection from Newton's *Principia* Supplementary: Margaret Osler, *Reconfiguring the world*, ch. 8
Nov 21/23	**Tutorial 7** What role does experiment play in science?
Mon Nov 26	**Collecting the World** Readings: Blackwell (1737-39) *A Curious Herbal* (selections) Linnaeus the *Systema Naturae* (1735); selection from Buffon "Initial Discourse" (1753)
Wed Nov 28	**Chemical Affinities: Antoine Lavoisier, Marie-Anne Paulze and the Chemical Revolution** Reading: selections from A.-L. Lavoisier and Séguin, *First report on animal respiration* and *First report on animal transpiration*; M.A. Lavoisier, images of experiments on respiration.
Nov 28/30	**Tutorial 8**

Mon Dec 3	**Shocking Discoveries and the end of the Old Order** Reading: selection from Nicholson "Account of the New Electrical Apparatus of Sig. Alex. Volta . . ."
Tue Dec 4 (Monday schedule)	**Review**
Dec 6-16	**Exam Period**

WINTER 2019 TERM

SECTION A: SCIENTIFIC MODERNITY: ENLIGHTENMENT, ROMANTICISM, AND MACHINES

Mon., Jan. 7	**Introduction: Enlightenment Science, Romanticism, and Machines** Reading: Mary Sommerville. 1834. "On the Connexion of the Physical Sciences.".
Wed., Jan. 9	**The Rise of the Machines** Start reading: Herman von Helmholtz, "On the Conservation of Force" [Brightspace]
Jan. 9/11	Tutorial
Mon, Jan. 14	**The Triumph of the Machines** Finish reading: Herman von Helmholtz, "On the Conservation of Force" [Brightspace]
Wed., Jan. 16	**Rage against the machine: Romanticism, Colour and Archetypes** Readings: Goethe, *Theory of Colours*, Goethe, "Experiment as Mediator between Object and Subject", Goethe, "Maxims and Reflections" [Brightspace]
Jan. 16/18	Tutorial
Mon., Jan. 21	**Being There: Global Science, Indigenous Knowledges** Reading: Von Humboldt, Cosmos [Brightspace]]
Wed, Jan. 23	**Natural Theology: God's Machines** Readings: Paley, Natural Theology (in Carroll, The Origin of Species, pp. 565-573), Mathus, Principles of Population (in Caroll, ed. The Origin of Species, pp. 595-604)
Jan. 23/25	Tutorial

SECTION B:	THE DISCOVERY OF HISTORY: ORIGINS AND LIFE
Mon., Jan. 28	**Deep Time: Nature goes Historical** Reading: Lamarck, Zoological Philosophy (in Carroll, ed. Origin of Species, pp. 573-579); Lyell, Principles of Geology (in Caroll, ed. The Origin of Species pp. 605-609)
Wed, Jan. 30	**Darwin I: Origins** Reading: As much as possible from Darwin's *Origin of Species* (1859), with chapter XIV being essential (Carroll)
Friday Feb 1	**George III (Munro) Day, University Closed, No Tutorials**
Mon., Feb. 4	**Darwin II. The Origin of Species** Readings: Darwin's *Origin of Species*, concentrating on "Recapitulation and Conclusion"
Wed., Feb. 6	**The Descent of Man** Readings: Darwin, *The Descent of Man* (in Carroll, ed. Read as much as possible, but concentrate on "Recapitulation and Conclusion", pp. 279-398)
Feb. 6/8	Tutorial
Mon., Feb. 11	**Sociobiology and Eugenics** Readings: Margaret Sanger, "Birth Control and Racial Betterment"; Carnegie, "Gospel of Wealth"; Kropotkin, "Mutual Aid" [Brightspace]
Feb. 13	**Mendel's Peas** Reading: Mendel, *Experiments in Plant Hybridisation*; Mayr, "80 years of watching the evolutionary scenery", [Brightspace]
Feb 13/15	**TEST II. In Tutorial of February 13/15**
Week of Feb. 18-22	**Winter Study Break** Start reading the *Double Helix* and *Men Who Made a New Physics.*
Mon. Feb 25	**The Double Helix: Life as a Code** **Short Paper II due (4pm, HOST office)** Reading: Watson, *The Double Helix*
Wed., Feb 27	**The Double Helix II: Cracking the Code** Reading: Finish reading Watson, The Double Helix
Feb. 27/Mar 1	Tutorial

SECTION C:	THE DESTRUCTION OF THE OLD ORDER
Mon., Mar. 4	**Cracking Atoms and Glass Ceilings** Readings: Curie, "Method of Research" [Brightspace], Cline, *Men Who Made a New Physics* [pp. 1-31]

Wed., Mar. 6	**Breakdown!!** Reading: *Men Who Made a New Physics*, pp. 31-108
Mar 6/8	Tutorial
Mon., Mar. 11	**Relativity: Dissolving Space and Time** Reading: *Men Who Made a New Physics*, pp. 108-172
Wed., Mar. 13	**Quantum: The End of Certainties** Reading: Cline, *Men Who Made a New Physics*, pp. 172-235
Mar 13/15	Tutorial
Mon., Mar. 18	**Physics and Philosophy: The Destruction of the Old Order** Reading: Cline, *Men Who Made a New Physics*, pp. 235-end
Wed., Mar. 20:	**Blowing up the World: Big Science and the Bomb** Reading: Einstein, "Letter to F.D. Roosevelt" (2nd August, 1939), browse the primary sources available at www.dannen.com/decision
Mar 20/22	Tutorial

SECTION D: COSMOPOLITICS: LIVING WITH TECHNOLOGY

Mon., Mar. 25	**Big Science II: Rebuilding Life and the Human Genome Project** Reading: TBA [Brightspace]
Wed., Mar. 27	**Global Science: Ecology and the Rise of Environmentalism** Readings: John Muir, My First Summer in the Sierra (1911), ch. 5, "The Yosemite": vault.sierraclub.org/john_muir_exhibit/writings/my_first_summer_in_the_sierra/chapter_5.aspx Rachel Carson, Silent Spring (1962) [Brightspace]
Mar 27/29	Tutorial
Mon., Apr. 1	**The History of Everything (From a Cyborg Point of View)** Reading: Selection from Stephen Hawking, "A Brief History of Time" [Brightspace]
Wed., Apr. 3	**Last Class: Reviewing Everything**
Apr. 10-26	Exam Period