HSTC1202.03 / HSTC 2212.03 / SCIE2002.03 / HIST2076.03
Introduction to the History of Science II:
From The Birth of the Modern to the Present
Online section

History of Science and Technology, University of King's College – Winter 2022

Territorial Acknowledgement

The University of King's College sits on ancestral and unceded Mi'kmaw territory, subject to the Peace and Friendship Treaties that are the basis for peaceful co-existence and good relations among all who live in Mi'kma'ki.

Course description:

This course covers the creation of modern science, from the radical changes of the Enlightenment to contemporary notions of technoscience and our place in nature and the cosmos. It follows the themes and contexts introduced in Introduction to the History of Science I and is open to first year students and above (whether pursuing a BA or BSc degree).

Course objectives:

Upon completing this course, students should be able to:

- explain the major developments in science from the Enlightenment to the present
- analyze the historical relationship between science and society
- describe the contributions of major figures in the modern history of science
- identify intellectual and social factors that cause scientific knowledge to change
- synthesize material from different topics to make arguments about particular subjects and about the history of science in general
- write a cogent essay about the development of science
- engage in analysis and debate about the history of science in a tutorial setting

Course structure:

For the most part, this course is designed to let you proceed through the week's materials at your own pace. The weekly tutorial is the only live hour of class each week. Course materials are divided into weekly modules that can be accessed through Brightspace. Each module will begin with a checklist of tasks to complete. These tasks will usually consist of a brief introductory video, assigned readings, and a short "focus" video on a specific aspect of the weekly topic. During some weeks, there will be other activities or assignments that are due, so please check the schedule or checklist each week. Generally, you can complete the tasks when you want, but assigned readings should be completed ***prior to tutorial on Thursday*.**

Location and time:

online; synchronous tutorial section via Collaborate: Thursday, 1535–1625 Atlantic Time

Instructor: Adam Richter, PhD – richtera@dal.ca

Virtual office hours: Wednesday, 1330–1430 – or by appointment
Prerequisites: None

Course texts:

During most weeks, you will be assigned the following readings:

1) A selection from Andrew Ede and Lesley B. Cormack, *A History of Science in Society: from Philosophy to Utility*, 3rd ed. (University of Toronto Press, 2017)
2) A scholarly article or book chapter posted on Brightspace
3) A primary source posted on Brightspace

Variations from this format will be noted on the schedule below and in the weekly checklist. The Ede and Cormack book is available in the King's library. Online versions are also available, including through the Dal and King's library systems, but these versions limit the number of users at a given time. If you find a copy of the book elsewhere, please ensure that it is the **third edition.** Also note that some online versions (but not the one available through the library system) may have different pagination, so note the section headings listed in the schedule and checklist. **Please complete the readings prior to the scheduled tutorial on Thursday and be prepared to discuss them in class.**

Grade breakdown

- Short essay – **Due February 5** – 20%
- Research essay – **Due March 19** – 30%
- Take-home exam – **Due April 6** – 30%
- History of science meme – 5%
- Tutorial participation – 15%

Weekly Schedule

Week 1: Introduction to the course – January 5–8 (short week)

Introductory tutorial: Thursday, January 6
Note: this tutorial will mainly be an information session for you to learn and ask questions about the course. Attendance is expected, but participation will not be assessed. All you need to do is come prepared with any questions you'd like to ask.
Readings and Focus video: none

Week 2: Scientists Serving Industry and Empire – January 9–15

Readings

1) Ede and Cormack, Chapter 7: 225–243 (from "The Professionalization of Science and Science Education" to end of chapter)
2) John McAleer, "'Stargazers at the World's End': Telescopes, Observatories and 'Views' of Empire in the Nineteenth-Century British Empire," *British Journal for the History of Science* 46 (2013): 389–413
3) Dmitri Mendeleev, "Introduction," *Principles of Chemistry* vol. 1, pp. 1–10, 22–27

Focus video: Steam power and society

Tutorial: Thursday, January 13

Week 3: Evolution and Genetics Part 1 – January 16–22

Readings

1) Ede and Cormack, Chapter 7: 211–225 (start at "Catastrophe or Uniformity: The Geological Record", stop at "The Professionalization of Science and Science Education"); Chapter 9: 282–287 ("Mendel and the Mechanism for Evolution")
2) Sarah Qidwai, "Darwin or Design? Examining Sayyid Ahmad Khan's Views on Human Evolution" in *The Cambridge Companion to Sayyid Ahmad Khan* (Cambridge: Cambridge University Press, 2019), 214–232
3) Charles Darwin, *The Descent of Man*, Introduction and Chapter 1

Focus video: Responses to Darwinism

Tutorial: Thursday, January 20

Week 4: Atoms and Energy – January 23–29

Readings

1) Ede and Cormack, Chapter 8: 245–273 (entire chapter)
2) Geoffrey Cantor, "Thompson, Biographer," *Centaurus* 63 (2021): 475–488
3) Michael Faraday, *The Various Forces of Nature*, "Lecture V: Magnetism–Electricity," pp. 122–146

Focus video: Spectroscopy and the sciences

Tutorial: Thursday, January 27

Week 5: New Directions in Physics – January 30–February 5

Readings

1) Ede and Cormack, Chapter 9: 276–282 (start at "The Unfinished Business of Light", stop at "Mendel and the Mechanism for Evolution"); Chapter 10, 299–304 (from start of chapter, stop at "Evolution, Cellular Biology, and the New Synthesis")
2) Massimiliano Badino, "Schooling the Quantum Generations: Textbooks and Quantum Cultures from the 1910s to the 1930s," *Berichte zur Wissenschaftsgeschichte* 42 (2019): 290–306
3) Albert Einstein, selections from "On the Electrodynamics of Moving Bodies" and "What Is the Theory of Relativity?", 338–344

Focus video: Einstein, philosophy, and religion

Tutorial: Thursday, February 3
Short essay due Sunday, February 5 at 11:59 p.m.

Week 6: Evolution and Genetics Part 2 – February 6–12

Readings

1) Ede and Cormack, Chapter 10: 304–308 (start at "Evolution, Cellular Biology, and the New Synthesis", stop at "Science and the State: The Atomic Bomb"), 320–325 ("Discovering DNA" to end of chapter)
2) Norberto Serpente, "More than a Mentor: Leonard Darwin's Contribution to the Assimilation of Mendelism into Eugenics and Darwinism," *Journal of the History of Biology* 49 (2016): 461–494
3) T.H. Morgan et al., selections from *The Mechanism of Mendelian Heredity*, vii–ix, 1–26

Focus video: The Scopes "monkey" trial

Tutorial: Thursday, February 10

Week 7: Science and the World Wars – February 13–19

Readings

1) Ede and Cormack, Chapter 9: 275–276 (introductory section), 288–297 (from "Science and War" to end of chapter); Chapter 10, 308–320 (start at "Science and the State: The Atomic Bomb", stop at "Discovering DNA")
2) Arne Schirrmacher, "Sounds and Repercussions of War: Mobilization, Invention and Conversion of First World War Science in Britain, France and Germany," *History and Technology* 32 (2016): 269–292
3) J. Robert Oppenheimer, "Chapter 10: War and the Nations" in *Atom and Void: Essays on Science and Community*, 133–142

Focus video: The military origins of NASA

Tutorial: Thursday, February 17

WINTER STUDY BREAK – FEBRUARY 20–26 – NO CLASS ACTIVITIES

Week 8: The Cold War and the Space Race – February 27–March 5

Readings

1) Ede and Cormack, Chapter 11: 327–329 (introductory section), 337–353 (from "The Space Race" to end of chapter)
2) Fraser MacDonald, "Space and the Atom: On the Popular Geopolitics of Cold War Rocketry," *Geopolitics* 13 (2008): 611–634
3) John F. Kennedy, "Special Message to the Congress on Urgent National Needs," 392–396
4) Vannevar Bush, selection from *Modern Arms and Free Men*, 416–421

Focus video: The Walt Disney company and American science

Tutorial: Thursday, March 3

Week 9: The Environment and Environmentalism – March 6–March 12

Readings

1) Ede and Cormack, Chapter 11: 330–335 (start at "The International Geophysical Year [IGY]", stop at "Mapping the Universe: The Steady State vs. the Big Bang"); Chapter 12: 374–376 ("Ecology and the Environment"); Chapter 13: 402–403 ("Climate Change")
2) Karl Jacoby, "Class and Environmental History: Lessons from 'The War in the Adirondacks', *Environmental History* 2 (1997): 324–342
3) Lynn White Jr., "The Historical Roots of Our Ecological Crisis," 192–201

Focus video: Rachel Carson and DDT

Tutorial: Thursday, March 10

Topic and tentative argument for research essay due Wednesday, March 9 at 11:59 p.m.

Week 10: Understanding the Cosmos – March 13–19

Readings

1) Ede and Cormack, Chapter 11: 335–337 ("Mapping the Universe: The Steady State vs. the Big Bang"); Chapter 12, 369–373 (start at "Exploring Space", stop at "Physics: The Very Big")
2) Helge Kragh, "Naming the Big Bang," *Historical Studies in the Natural Sciences* 44 (2014): 3–36
3) Georges Lemaître, "The Primeval Atom," 371–385

Focus video: Dark matter and dark energy

Tutorial: Thursday, March 17

Assignment:

Research essay due Sunday, March 19 at 11:59 pm

Week 11: Computers and the Information Age – March 20–26

Readings

1) Ede and Cormack, Chapter 12: 359–368 (stat at "Science Produces Consumer Goods", stop at "The Pill: Science and Gender Relations")
2) Gretchen McCulloch, "Chapter 3: Internet People" in *Because Internet: Understanding the New Rules of Language*, 63-108
3) A.M. Turing, "Computing Machinery and Intelligence," *Mind: A Quarterly Review of Psychology and Philosophy* 49 (1950): 433–460

Guest focus video: Ryan Scheiding, Video games and atomic memory

Tutorial: Thursday, March 24

Week 12: Changes and Challenges in the 21st Century – March 27–April 6 (long week)

Readings

1) Ede and Cormack, Chapter 12: 377–384 (from "DNA and the Human Genome Project" to end of chapter); Chapter 13: 387–405 (entire chapter)
2) Leah Aronowsky, "Gas Guzzling Gaia, or: A Prehistory of Climate Change Denialism," *Critical Inquiry* 47 (2021): 306–327
3) Radu Guiaşu, selections from *Non-native Species and Their Role in the Environment: The Need for a Broader Perspective*, 1–7, 203–224

Focus video: Exoplanets and extraterrestrials

Tutorial: Thursday, March 31

Assignment:
Take-home exam posted Monday, April 4 and due Wednesday, April 6 at 11:59 p.m.

Please also consult the King's "Important Dates" page for information about the university's calendar, including add/drop dates: https://ukings.ca/current-students/important-dates/.

Assignments

Written assignments: There are two written assignments in this course. The first is a short essay on the following question: What was a scientist in the 19th and early 20th centuries? Regarding this period, unlike earlier ones, we can refer to "scientists" without anachronism; your task will be to describe the qualities and activities of a scientist in this period.

If you are taking this course as a first-year course, the short essay will be 800–1000 words; if you are taking it as a second-year course, the short essay will be 1000–1200 words. This assignment will be due **February 5.**

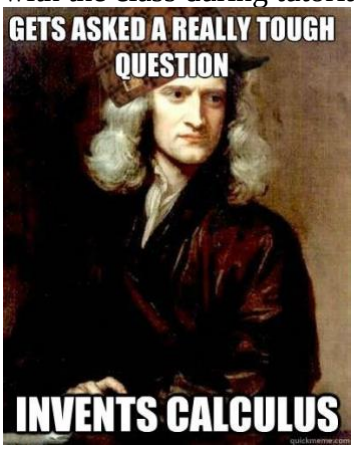
The second written assignment is a research essay. You can choose any topic related to the history of science, medicine, technology, engineering, or mathematics since the year 1800. However, you must be sure to develop a clear **argument** about that topic, rather than merely describing it. You must also **submit your topic and a tentative argument** to me by email no later than **March 9.** Failure to do this will result in a deduction of 5% from your essay grade. After I have reviewed your topic and tentative argument, I'll reply letting you know whether you're on the right track or whether changes need to be made.

This essay will involve a considerable amount of research, so it's a good idea to get started early. A successful essay will likely require at least 4-5 secondary sources, which should be scholarly books and articles rather than websites and encyclopedias. You're also encouraged to consult primary sources, although this is not a requirement of the assignment.

If you are taking this course as a first-year course, the research essay will be 1800–2000 words; if you are taking it as a second-year course, the research essay will be 2000–2200 words. This assignment will be due **March 19.**

Additional instructions about each written assignment will be provided as the deadline approaches.

History of science meme: Early in the course, everyone will sign up for a week during which they'll prepare a meme related to the week's materials. If it's your week, you'll share your meme with the class during tutorial. I have in mind memes in this format with bold text over an image:



These can be created quickly on a variety of websites and apps. But you can also get more creative and interpret "meme" as broadly as you'd like. This will be worth 5% of your grade. Let's see your dankest history of science memes!

Take-home exam: For the final exam, will be asked to pick two essay questions from a series of options. The questions will ask you to synthesize material from multiple lectures. The main goals will be to demonstrate knowledge of lecture material and to formulate an argument about a trend or historical development that we will have traced throughout the course. **The exam will be posted on April 4 and will be due at 11:59 p.m. on April 6.** Late exams will only be accepted for medical reasons, as described in the policy for missed assignments below.

Tutorial participation: This grade will not be based on mere attendance of the weekly tutorials. To get a high grade, you must engage in a meaningful and respectful dialogue with other students related to the week's materials, especially the assigned readings. Each week, you should come to tutorial having completed the readings and taken notes that you can refer to during our discussion. Our collaborative goals during the tutorials are to analyze the texts with a critical eye and to make connections with other material from the course. But if you're not sure how to approach the material, start by making a note of whatever you found interesting and bring that up in class. That's a great way to get the discussion going!

COVID contingency plan: Because we are already meeting remotely, there is no need for a specific contingency plan related to COVID. However, please consult the University of King College's Central COVID Safety Plan (here) and our course's policy for missed assignments and tutorials below,

Missed assignments and tutorials:
Students experiencing short-term absences of three consecutive days or fewer resulting in missed or late academic requirements must:

a) contact the instructor by phone or email before the academic requirement deadline or scheduled time and;
b) complete a Student Declaration of Absence form or provide alternate verification of the absence to the instructor, on-line through Brightspace, or via instructor e-mail within three calendar days following the last day of absence

To access the declaration form, click here. For more information, visit this site.

The penalty for late submission of assignments is a **3% deduction in the final mark per calendar day** that the work is late, to a maximum of 15%, with one day considered to have elapsed at 12:01 a.m. at the end of the day when the essay is due. If an assignment is more than five days late, it will not be accepted, and a mark of **zero (0%)** will be assigned, unless a request for special consideration is made and granted by the instructor.

Grading: The University of King's College uses the following scale for defining and correlating letter grades, number grades, and grade point values:

Grade	Percentage Grade Value	Grade Point Value	Definition	
A+	90-100	4.3	Excellent	Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.
A	85-89	4.0		
A-	80-84	3.7		
B+	77-79	3.3	Good	Evidence of grasp of subject matter, some evidence of critical capacity and analytical ability; reasonable understanding of relevant issues; evidence of familiarity with the literature.
B	73-76	3.0		
B-	70-72	2.7		
C+	65-69	2.3	Satisfactory	Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from the university experience.
C	60-64	2.0		
C-	55-59	1.7		
D	50-54	1.0	Marginal Pass	Evidence of minimally acceptable familiarity with subject matter, critical and analytical skills (except in programs where a minimum grade of 'C' or 'C+' is required).
F	0-49	0	Inadequate	Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature.
INC		0	Incomplete	
W		Neutral and no credit obtained	Withdrew after deadline	

ILL		Neutral and no credit obtained	Compassionate reasons, illness	

Urkund: Digital copies of the assignments handed in through Brightspace will be randomly checked by the Urkund tool, a plagiarism detector. You are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of your work. You must inform me no later than **January 22** of your intent to choose an alternate method.

Videoconferencing Rules:
1. Using Collaborate: We will be using the Collaborate conferencing platform, which is built into Brightspace. The meetings are secure: only students enrolled in the class will be able to join. In an unlikely event of outside interference, I will shut the meeting down immediately. Please click on the link again and I will readmit you one by one. If technical difficulties occur, we will switch to a password-protected Zoom conference.

A few simple rules are: a) mute your mic and only unmute yourself when it is your turn to speak; b) use the raise-hand button if you wish to speak; c) please refrain from using the chat function: use it only when you think it is necessary (e.g., you are unable to unmute yourself or you prefer not to speak into the microphone) d) dress with decorum; turn off your camera if you need to get up, yawn, or grab a bite to eat….

As a rule, the Collaborate sessions will NOT be recorded for reasons of privacy and consent, but some exceptions may apply if we have a guest lecture (in which case you will be notified ahead of time).

2. Copyright and privacy: Recorded lectures remain the intellectual property of the instructor and guest lecturers. Reposting, sharing, further distributing or otherwise misusing them violates their privacy and copyright interests and is expressly prohibited without explicit permission. Strict privacy protections also apply. Provincial and federal laws restrict the dissemination of personal information about academic staff and students—including email addresses, phone numbers, residential information, images and videos. In light of all this, tutorials should not be recorded by students or screenshots taken without express permission.

3. Netiquette: When you post comments on discussion boards and engage with other students and the instructor during virtual meetings, it is important to understand how to interact with one another online. We will work together to create the environment of constructive dialogue, inclusiveness, and mutual respect. You can read more about the rules of netiquette here.

Academic Rules and Regulations
This course is governed by the academic rules and regulations set forth in the University of King's College Calendar.

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 (Read more here).

Academic integrity issues involving King's courses are normally dealt with by the Academic Integrity Officer (AIO) of the University of King's College. Instructors may at their discretion check digital copies with the Urkund tool on Brightspace, a plagiarism detector. In this case, students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work. Students must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method.

Keeping academic term

Examination dates cannot be changed to accommodate travel plans, work arrangements and personal activities. It is the obligation of each student to ensure that his or her travel arrangements or other activities do not conflict with in-class activities or the end-of-term examinations. The keeping of academic term is the responsibility of every student.

Students' responsibilities on 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).

Accessibility and Accommodations

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (NS, NB, PEI, NFLD).

If there are aspects of the design, instruction, and/or experiences of this course that result in barriers to your inclusion, please contact the Student Accessibility Centre.

Please note that our classroom may contain accessible furniture and equipment. It is important that these items remain in the classroom, undisturbed, so that students who require their use will be able to fully participate.

Codes of conduct

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 here).

(2) Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student 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 here).

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.

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.

The full list of characteristics protected under the Nova Scotia Human Rights Act can be found here.

Sexualized Violence
King's College has its own Sexualized Violence Awareness, Prevention and Response Policy, and its own Sexualized Violence Prevention and Response Officer (SVPRO), Jordan Roberts. The SVPRO can provide support around experiences of sexualized violence to all members of the King's community. This support is confidential and can include informal discussion, academic accommodations, and undergoing an internal reporting process. All decisions on where a disclosure of sexualized violence goes are in the hands of the individual disclosing. Academic accommodations may be available to those who do not wish to make a formal report. If you are supporting someone who has experienced sexualized violence the SVPRO is also available as a support to you. More information about the SVPRO and the Sexualized Violence Awareness, Prevention and Response Policy can be found online.

The SVPRO's contact information is: jordan.roberts@ukings.ca, 902-229-6123, Office: 077 Lower Link.
Confidential voicemail and text option. Calls and messages responded to Monday–Friday 9–5.

Equity
King's College Equity Officer Rhema Ferguson provides resources, education and confidential support for faculty, staff and students at King's College. The Equity Officer's principal role is to support under-represented and otherwise marginalised members of the King's community. The Equity Officer provides information, takes proactive measures and is available for consultation to all members of the university community on issues concerning equity, inclusivity, discrimination and harassment. The Equity Officer works closely with equity and accessibility committees and the Sexual Violence Prevention and Response Officer. The Equity Officer assists in the implementation of the Policies and Procedures for Prevention of Discrimination and Harassment. All complaints or information seeking around this policy from those who have been affected will remain confidential and decisions are led by the individual disclosing. The policy and procedures can be found in the Yellow Book.

The EO's contact information is: rhema.ferguson@uking.ca, 902-226-5103, Office: Lower Link Confidential voicemail and text option. Calls and messages responded to Monday–Friday 9–5.

University Policies and Programs
Important Dates in the Academic Year (including add/drop dates)
Dalhousie Grading Practices Policy
Grade Appeal Process
Scent-Free Program

Learning and support resources
Academic Support and Advising
King's
Dalhousie

Health and Wellness
Student Health & Wellness Centre
On Track (helps you transition into university, and supports you through your first year at King's and Dalhousie and beyond): www.dal.ca/campus_life/academic-support/On-track.html
Dalhousie Multifaith Services is a non-threatening space where Dalhousie and King's students, staff, and faculty can address the basic questions of meaning and purpose in their lives—no matter what their faith, philosophy or doubt may be. Dalhousie Multifaith Services provides chaplains for Buddhist, Anglican, Baptist, Lutheran, Pentecostal, United Church of Canada, Baha'i, Hindu, Jewish, Roman Catholic, Sunni Muslim and Unitarian Universalist faith traditions. The University of King's College chaplain, Fr Ranall Ingalls, whose office is in the King's A&A Building, is a Christian priest in the Anglican tradition, but he is at King's for everyone and not merely Anglicans or Christians. Read about the King's Chapel here.

Student Support, Advising and Advocacy
Indigenous Student Centre
Elders-in-Residence. The Elders-in-Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803.
Black Student Advising
International Centre and academic advising for International Students
South House Sexual and Gender Resource Centre
LGBTQ2SIA+ Collaborative
Dalhousie Student Advocacy Service (DSAS)
Dalhousie Ombudsperson
Human Rights and Equity Services

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

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at King's College and Dalhousie. See here:
and Copyright Office.

Libraries:
King's library
Dalhousie libraries

Technical issues: To get support for course or university technologies (Brightspace, Collaborate Ultra, email, Microsoft products), contact Information Technology Services (ITS) at support@dal.ca.