HISTORY 2623 X2
HISTORY OF SCIENCE AND TECHNOLOGY
SLOT #1
Monday, Wednesday, Friday
8:30 - 9:30
BAC 142

Dr. David Duke
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Office Hours, Winter Term:
Monday: 9:30 - 10:30
Tuesday: 9:00 - 10:00

Course Introduction / Objectives: This Lecture Course (LC) survey will introduce you to the major themes and concepts of the history of science and its close relation, technology. We will be focussing primarily on the Western experience (that is, the cultures of the Classical Era, Europe, and the Industrialised and post-Industrial world), but discussions regarding other cultures of science and technology will be introduced also. As we shall see in this course, science and technology derive from different sources, but combine to create the world in which we live today. As such, one is as important as the other -- but it is crucial to recognise that each is nevertheless distinct from the other. That distinction -- between "pure" science on the one hand and the application of technology to the solution of problems of everyday life on the other -- and the disjunction that the distinction can create are central themes of this course. We shall also pay close attention to the concept of "scientific revolutions": what are they? Do they really exist as revolutionary moments in history, or are they simply imagined by later generations as the moment at which things changed?

In this course you will develop both skills and a broader knowledge base of the history of science, as follows: you will --

- Learn the basic historical structure of science in the Western world, from the time of Classical civilisations to the present
- Develop an understanding of the way in which modern scientific disciplines and technological pursuits developed over the course of the last 2,500 years
- Learn to read, analyse, and comment upon primary source documents written by natural philosophers, scientists, inventors, and historians of science and technology
- Develop techniques of historical investigation that work with both primary and secondary sources to produce logical, coherent, and convincing arguments concerning problems encountered in the history of science
- Become familiar with the structure of paradigm shifts in the development of scientific consciousness, especially over the last 500 years or so
- Understand the means by which the increasing ubiquity of technology has created, in large part, the modern world in which we live
- Appreciate the changing nature of science and technology in the modern and post-modern worlds
• Understand the impact of science and technology as forces that shaped the historical development of society in the Western world

It should be said that the material in this course can be challenging and difficult. This is not an easy "arts elective" course; instead it is a concentrated and thematic examination of one of the most important pursuits -- indeed, some have claimed science and technology as the defining pursuit -- of Western Civilisation.

**Acadia Advantage:** Acadia Advantage technology that will be employed in this course includes the daily use of PowerPoint presentations in lectures, an emphasis on working with online sources in support of lectures and in developing research topics, and the use of e-mail for communications (note that I will endeavour to answer all emails within 24 hours of receipt; usually less if I’m in my office when they arrive). PowerPoints will be posted on Acorn prior to the course mid-term, and again prior to the final examination. If you rely on these alone instead of actually attending lectures, I guarantee that you will fail the course. There is no substitute for the face-to-face communication afforded by lectures and discussions.

**Disability Access:** If you are a student with a documented disability who anticipates needing accommodations in this course, please inform me after you meet with Kathy O’Rourke (902-585-1823) disability.access@acadiau.ca or Abu Kamara (902-585-1291) abu.kamara@acadiau.ca in Accessibility Services, Rhodes Hall.

**Aid with Written Work:** Your best defence against unpleasant surprises with your written work is to maintain contact with your professors in all your courses. This way you can ensure that you know exactly what they're looking for, and you may also be able to show them samples (drafts) of the assignment that you're working on and receive feedback. The Writing Centre also offers free help to all students wishing to improve their writing skills. To book a one-on-one appointment with a writing tutor, click below:

[writingcentre.acadiau.ca/writing-tutorials.html](http://writingcentre.acadiau.ca/writing-tutorials.html)

To see which helpful presentations and workshops you might want to attend this year, click here:

[writingcentre.acadiau.ca/workshops-and-presentations.html](http://writingcentre.acadiau.ca/workshops-and-presentations.html)

Books and journal articles from the library can improve your assignments, labs, and papers. Visit the library at http://library.acadiau.ca. View resources specifically selected for your course at http://libguides.acadiau.ca/history and contact the History Librarian, Britanie Wentzell (britanie.wentzell@acadiau.ca or 1403 for research help.

**Textbook and Other Required Reading**

There is only one required textbook for this course:

You are welcome to purchase used copies of the second edition of this textbook, many of which are available on Amazon.ca, for example. Do not purchase the first (2004) edition, however, as it is very different in content and structure from the latter editions and would not be of much use to you for the course.

In addition to this textbook, there is a not-insignificant amount of other material that is required reading for this course, in the form of source materials deposited on the class's Acorn page. Week-by-week readings are outlined in the lecture / course schedule below. As a general ballpark figure, you should expect to read approximately 80-100 pages per week for this course overall. Your textbook comprises only some 450 pages of this. The rest will be represented by the primary and secondary sources available on Acorn. From time to
time you will probably find some of the primary sources to be difficult to work with and they will quite probably require considerable concentration and effort on your part. If you don't "get" them the first time you read them, don't worry! A significant component of this course will be the in-class discussions of the sources, and that's something that we will be doing cooperatively, not in isolation. However, you should still approach the sources with seriousness and a willingness to work hard with them: they will not be understood by skimming the night before class.

The audio files will consist of mp3 files covering two main themes: the issue of controversy in science, and the concept of scientific paradigms (the so-called "big ideas" in science and technology). The audio programmes, like the readings, are required material: I will refer to them in class and expect you to answer questions intelligently about their content when asked.

### Assignments and Grade Weighting

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Grade Weight</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Midterm Test</td>
<td>15%</td>
<td>In Class, February 14th</td>
</tr>
<tr>
<td>Discussion Session Spot Quizzes</td>
<td>25%</td>
<td>Quizzes will be held randomly throughout the Term.</td>
</tr>
<tr>
<td>Research Project Proposal</td>
<td>10%</td>
<td>February 2nd, electronic copy, due on Acorn by midnight</td>
</tr>
<tr>
<td>Research Project</td>
<td>25%</td>
<td>March 23rd, electronic copy, due on Acorn by midnight</td>
</tr>
<tr>
<td>Final Examination</td>
<td>25%</td>
<td>During Winter Term Exam Period, Date T.B.A.</td>
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PLEASE NOTE: THE LATE PENALTY FOR ALL WRITTEN WORK IS 5% PER CALENDAR DAY IN THE ABSENCE OF AUTHENTICATED OR DOCUMENTED PERSONAL OR MEDICAL CIRCUMSTANCES.

### Assignment Descriptions

1. MIDTERM TEST:

This exercise will test your knowledge of the covered in class up to the date of the test. It will be held in class (obviously) on February 14th. Everything covered in the course (both lectures and readings) is fair game for testing. The midterm test is worth 15% of your grade.

2. DISCUSSION SESSION SPOT QUIZZES:

As outlined in the lecture schedule below, you can see that this course will generally consist of "standard" lectures on Mondays and Wednesdays, while Fridays will usually be devoted to the discussion of readings and/or audio files assigned as homework as the course progresses. The source readings and audiofiles are posted on the course Acorn page as noted above, in folders that refer to the week in which we shall work with them both as sources for lectures and in discussions. You are expected to attend the discussion sessions and to participate also. I am a prof who will pick on each and every one of you with questions, in class. I will expect you to be able to make a reasonable stab at answering them: I am not looking for "right" answers, but answers that demonstrate that (a) you have prepared for the day's discussion by doing the readings or listening to the audiofiles and (b) that you have thought about them. In order to ensure that you are keeping up with your readings and audio work, there will be various spot quizzes scattered throughout the term. I will not indicate the number of quizzes (if I did, then towards the end of term you would be able to guess the number of remaining quizzes and when they would be held), but the total combined value of all quizzes 25% of your grade, and each quiz is equal in value. Questions on the quizzes will pertain exclusively to readings and to material from audio programmes that are required for discussion sessions.
3. RESEARCH PROJECT:

This is an assignment that will require you to produce a report approximately 10 pages in length on any problem derived from the history of science and technology. You can select any topic you wish, but you must submit a proposal to Acorn by midnight on February 2nd. A good starting strategy for possible essay topics is to consult your course textbook. The proposal must contain the following information: your name and student id number; the tentative title of the essay; a 250-word outline of the topic with at least one and preferably more thesis questions that will guide your research; and a mechanically correct annotated bibliography of at least five sources, article or monograph. At least one of these sources listed must be a primary source; proposals that fail to include primary sources will suffer a grading penalty. Annotations need not be long -- 50 words each (that's about two or three sentences) or so -- but they must describe in general terms your plans for the source: how it will be used, what it contains, and so on. You must employ Chicago Manual of Style guidelines when preparing your bibliography and in the essay itself. Failure to do so will result in a significant grade reduction on mechanical grounds. You can access a brief style guide, covering elements of clear writing, correct citations, and the mechanical basics of Chicago Style, on the course's Acorn page.

Anyone who fails to submit a proposal on or before March 2nd will receive a 50% grade penalty on any final essay they submit.

The submitted proposal is worth 10% of your final grade for the course.

The essay itself should be about 10 pages (approx 2,500 words) in length. You must argue a position in a logically consistent fashion in order to do well in the essay. You must employ your sources, secondary and primary, to support your argument and to convince the reader that the weight of evidence is in your favour and is persuasive. If you fail in this task, your grade will suffer consequently. You must be mechanically polished to avoid a significant reduction (of at least one full letter grade) in your essay mark. This means that footnoting, spelling, grammar, bibliography, and so on must all be polished and correct. Sloppy work will result in an eroded grade at best, a failing grade at worst. If you use a spellchecker as an editor, I guarantee that your essay will contain numerous spelling errors. It will therefore receive a poor, perhaps even failing, grade.

SOURCES AND THE INTERNET: Pay attention to the evidence you employ in the research for your topic and for the construction of your essay: secondary sources should be in the form of monographs or articles uncovered through the Vaughan Library System or its associated article indices such as ProQuest or JSTOR. These are trustworthy (almost always, at least) as they have been vetted through a complex but effective process of peer review, and have also passed in most cases the acid test of acceptability administered by library professionals everywhere. The internet should be treated with a great deal more caution. Employment of the internet for secondary sources such as information from personal webpages or online encyclopaedias (especially Wikipedia) will result in a failing grade for your essay. Many online sources - such as those generated by research institutions or educational websites - are trustworthy and useful, however. If you've found a source online that you think might be useful but aren't sure whether it's safe or not, you must clear it with me first! Send me the URL and I will look at it. If you use a doubtful secondary internet source that I haven't cleared, your grade for the essay will likely suffer. You are, however, encouraged to use the internet to search for and retrieve primary sources -- works by scientists and / or inventors, or contemporary accounts of their activities, or paintings, sketches, engravings and so on of those activities -- whose inclusion broadens and deepens your research. The internet is an outstanding place to look for primary sources (indeed, many of the primary source readings for the course are derived from internet collections, such as Paul Halsall's History of Science Sourcebook). It is not a good place to look for secondary sources,
especially those represented by personal webpages. To give one example of why it's bad: I have seen many good sites on the subject of alchemy. But I have seen many, many more that were written by people who clearly believe that the alchemists were on to something as they attempted to transmute base metals into gold. Similarly, I have seen webpages that argue passionately (even today) that the earth is flat, and which provide pretty interesting and occasionally even historically accurate accounts of flat-earth belief in the Middle Ages. Just because some webpages contain potentially useful material doesn't mean that their owners aren't barking mad or that the majority of the information presented as factual is, in fact, trustworthy. The point is that most material accessible via the internet hasn't been peer-reviewed; as a consequence its utility is dubious at best to dangerous at worst.

NOTE ON SOURCES: If you're confused on the difference between primary and secondary sources, just remember this: primary sources are generated by the people involved in or directly observing the events described. Secondary sources are generated much later and are almost never generated by the people involved in the events being described and/or analysed. Secondary sources are therefore, in general at least, second-hand in nature and are based on primary sources, other secondary sources, or even on hearsay and rumour.

The essay is due as an electronic submission to Acorn by midnight on March 23rd. It is worth 25% of your final grade for the course. Fairly complete drafts (that is, with footnotes and a length in the ballpark of 8-10 pp) emailed to me as Word attachments by the evening of March 16th at the latest will be read by me and emailed back to you with comments. In other words, I will review a draft and provide comments for improvement, identify holes in your argument, and so on. The comments will be general in nature (I won't proofread or edit papers, for example, but will discuss argument, evidence, strength of thesis and conclusion, and so on). It has been my experience that students who take advantage of the draft review process improve their essay grade by 10 percent or more. Ironically, it's also been my experience that no more than ten percent of students take advantage of the free feature of having their prof read their work and suggest revisions to improve it. Even more ironically, those ten percent tend to be the ones that least need the revisions in the first place.

4. FINAL EXAMINATION:

The final examination will be of three hours' duration, will be closed-book, and will consist of short-answer and essay questions. It will be sat during the Winter Term examination period, date to be announced. It is worth 25% of your final course grade.

**Academic Integrity and Dishonesty**

I refer you to the section “Academic Integrity” to be found on p. 58 in the “Academic Policy and Regulations” section of the Acadia University Calendar, 2017-2018. You must be familiar with these guidelines to be enrolled in this course. Plagiarism is also viewed seriously by the Department of History and Classics: it is departmental policy that plagiarised work will receive a grade of F (zero), with no departmental appeal possible. In especially bad cases more severe penalties, including a course grade of F (zero) and/or a recommendation for expulsion from the university, are possible. If the transgression warrants it, I will not hesitate to seek the application of such a penalty. Please note that under no circumstances will I tolerate a breach of academic integrity: transgressions such as cheating, plagiarism, or actively aiding another student in such an act will result in -- at the very least -- a grade of zero on the offending assignment.

Having said this, I also want you to know that I am aware that for many of you issues of plagiarism are both worrisome and confusing. (Cheating is an entirely different and much more simple offence; if you don't know you're cheating, then there are problems far beyond mere academic integrity involved.) In order to
alleviate the plagiarism problems, you should certainly review the superb resources put together by the staff at the Vaughan Library

http://library.acadiau.ca/tutorials

and you should complete the online "You Quote it, You Note it!" tutorial that they have prepared. Paying attention to these resources will ensure that you will be able to avoid the various plagiaristic pitfalls that exist. (It also means that, if you do plagiarise, the defence of ignorance will not be available.) In any event, it all boils down to the best defence possible, thus: **IF IN DOUBT, PROVIDE A SOURCE!!!**

**Lecture Schedule**

**Week One: Jan 10 - 12:**  
*Note: there is NO CLASS for this course on Monday, January 8th!*  
Class introduction and welcome -- requirements explained, etc.  
What is "Science"? What is "Technology"?  
Readings: Ede and Cormack, *Introduction*; ACORN, Week 1

**Week Two: Jan 15 - 19:**  
Science and Technology in Preclassical Civilisations  
The Greeks  
Readings: Ede and Cormack, Chapter 1; ACORN, Week 2

**Week Three: Jan 22 - 26:**  
The Romans  
The Arab World  
Readings: Ede and Cormack, Chapter 2; ACORN, Week 3

**Week Four: Jan 29 - Feb 2:**  
Light in the Dark Ages: Mediaeval Science and Technology  
Readings: Ede and Cormack, Chapter 3; ACORN, Week 4

**Week Five: Feb 5 - 9:**  
The Explorers: Science in the 16th Century:  
Readings: Ede and Cormack, Chapter 4; ACORN, Week 5

**Week Six: Feb 12 - 16:**  
Mathematical Harmony, Earthly Battles: Astronomy and Technology, 1600-1650  
Readings: Ede and Cormack, Chapter 4; ACORN, Week 6  
*Midterm Test, in class, Feb 14*

**Week Seven: Feb 19 - 23: Reading Week - No Classes**

**Week Eight: Feb 26 - Mar 2:**  
The Scientific Revolution  
Enlightenment Science  
Readings: Ede and Cormack, Chapters 5 & 6; ACORN, Week 8

**Week Nine: Mar 5 - 9:**  
The Triumph of Technology: The Industrial Revolution
Week Ten: Mar 12 - 16:
Paradigm Shift I: The Newtonian Certainty to Einsteinian Relativity
Paradigm Shift II: Technology for the Masses
Readings: Ede and Cormack, Chapter 8 & Chapter 9 pp. 275-282; ACORN, Week 10

Week Eleven: Mar 19 - 23:
Science, Technology, and Total War
Science Serves the State: Genetics, Chemistry, and the Atomic Question
Readings: Ede and Cormack, Chapter 9, pp. 282-298 & Chapter 10; ACORN, Week 11

Week Twelve: Mar 26 - 30 (Mar 30 is Good Friday: No Class)
Science Serves Ideology: The Space Race
Science and its Discontents at the End of the Twentieth Century
Reading: Ede and Cormack, Chapters 11 & 12; ACORN, Week 12

Week Thirteen: Apr 2 - 6:
Science and Technology for the New Millennium: Challenges and Opportunities
Readings: Ede and Cormack, Chapter 13; ACORN, Week 13

Apr 9 - Last Day of Class: Review