BO1. History of Mathematics: a guide

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Introduction

There are many benefits to studying the history of mathematics. First and foremost is the extra colour that it adds to your mathematical studies: after years of hearing about particular ideas and name-checking various people, you may be just a little curious about where these ideas came from, and who these people were. What were they thinking about when they developed their mathematics and proved their theorems? What was going on around them to spark these ideas? Did they even prove the results that we attribute to them, or are things a bit more complicated? In any discipline, we lose something if we simply ignore the context (most particularly, the *historical* context) in which ideas arose — mathematics is no different. We gain a richer view of mathematics by considering the varied ways in which it has emerged in other cultures, and broaden our viewpoint by recognising that the way in which we do mathematics is not the only way in which it can be done.

An understanding of the history of mathematics can also aid in the comprehension of mathematics itself. When we learn mathematics, we learn it in a modern, polished form; the concepts have been clearly defined for us, and the theorems have already been given their neatest possible formulation. But this is usually not how the ideas developed in the first place, and by looking at where they came from, and by considering the often faltering and frequently messy steps that mathematicians took towards an understanding of these ideas, we may gain a greater intuition for *why* the definitions are given as they are nowadays, and *why* the theorems are stated in their modern forms. Moreover, it is reassuring to see that the mathematicians of the past did not have all the right answers straight away!

But the history of mathematics is not merely an aid to mathematical studies — it is a discipline in its own right, very closely related to mathematics, but not quite the same. An understanding of mathematics is certainly necessary in order to be able to do the history of mathematics properly, but there is very much more to the study of the history of mathematics than technical detail. In this course, we will not only explore the development of mathematics, but also the methods and attitudes that we need to adopt in order to study this development.

*Adapted from notes originally written by Jacqueline A. Stedall with input from Eleanor Robson and subsequently modified by Peter M. Neumann and Christopher Hollings.

You can find out more about studying the history of mathematics at the two Course Context Sessions, which will be held Friday of Week 1, and Tuesday of Week 2 both in L3 (and live-streamed).

What history of mathematics is not

The study of history in general seems to suffer from a misconception that is perhaps similar to one often found in the perception of mathematics. Just as many non-mathematicians seem to think that 'mathematics' and 'arithmetic' are one and the same, so non-historians sometimes view history simply as a catalogue of dates. Both misconceptions probably stem from the way in which these subjects are taught at school. At any rate, it should be stressed here and now that, like the popular view of mathematics, the general view of history is wrong: the study of history is *not* about lists of dates. We will certainly encounter dates during our study of the history of mathematics, just as someone studying mathematics will certainly encounter arithmetic, but these will merely be part of the context, and will not be an end in themselves. Moreover, contrary to what you may find in many books, the development of mathematics is not the linear story of how great mathematicians marched relentlessly towards the mathematics of today.

What history of mathematics is

When looking at the mathematics of the past, we should not expect to be able to understand it straight away. Depending on how far back we go, it will probably be written in a style and terminology entirely unlike that to which we are accustomed. Our first task, therefore, as historians of mathematics, is to interpret this mathematics. But (and this point cannot be stressed too strongly) it must be interpreted, as near as possible, *within the context in which it was written*. We cannot simply convert historical mathematics into modern terms — to do so would be to lose something of the original, and probably to distort it too.[1] Although we hardly notice it, the symbolism that we use in modern mathematics has developed in very particular ways over many centuries, so to reinterpret historical mathematics in modern terms is to impose a modern way of thinking that is almost certainly not present in the original text. The study of the history of mathematics cannot, therefore, concern itself simply with isolated texts — we must look at the broader mathematical environment within which mathematicians worked.

The word 'mathematician' is also slightly problematic. The idea of a professional mathematician is a relatively modern one. Many of the figures that we will encounter during the course pursued mathematics simply as a hobby. Others would not necessarily have identified

[1] Stepping away from mathematics for a moment, it seems appropriate here to quote some remarks made by Marguerite Yourcenar concerning her research for her fictionalised autobiography of the Emperor Hadrian: "Strive to read a text of the Second Century with the eyes, soul, and feelings of the Second Century; let it steep in that mother solution which the facts of its own time provide; set aside, if possible, all beliefs and sentiments which have accumulated in successive strata between those persons and us" (Marguerite Yourcenar, *Memoirs of Hadrian, and reflections on the composition of Memoirs of Hadrian*, English translation by Grace Frick, Penguin, 1986, p. 277).

themselves as mathematicians, but rather as scientists more broadly.[2] Here then is another reason to look closely at the context of historical mathematics: the people producing it did not necessarily consider themselves to be mathematicians, and, as a consequence, it probably did not emerge in the same way that mathematics develops today. Moreover, to pick up on a point made at the end of the preceding subsection, the history of mathematics is not simply the story of the major figures (usually white, male, and European) who are still remembered today: it is a much broader picture, featuring figures who are now largely forgotten, but whose contributions are nonetheless a vital part of the story.

As already indicated, the history of mathematics is messy, despite the fact that most general accounts of it are neatly packaged as straightforward linear stories. The historian of mathematics Jackie Stedall, whose work will be used frequently in the course,[3] spoke out against this view that "mathematics somehow progresses only by means of 'great and significant works' and 'substantial changes'":

> Fortunately, the truth is far more subtle and far more interesting: mathematics is the result of a cumulative endeavour to which many people have contributed, and not only through their successes but through half-formed thoughts, tentative proposals, partially worked solutions, and even outright failure. No part of mathematics came to birth in the form that it now appears in a modern textbook: mathematical creativity can be slow, sometimes messy, often frustrating.[4]

Our task as historians of mathematics is to make sense of this tangled tale.

Course structure

As you know from the course outline, this is a double unit that consists of two parts: a lecture course in Michaelmas Term, followed by a reading course in Hilary Term. The two parts are weighted equally towards the final mark. Generally speaking, the purpose of the course is to acquaint you with the history of the mathematics that you have met during the core courses of your first four terms in Oxford. For the most part, this translates into the history of European mathematics from around 1600 to 1900 (although some parts of the course do spill outside this range). Further details of the structure of the course can be found in the slides for the (first part of the) first lecture: the slides for each lecture will be posted on the course webpage throughout the term.

A great emphasis of both parts of the course is the use of primary materials: we will always endeavour to read the original works of historical mathematicians (in translation, where

[2] In fact, the word 'scientist' is another one that should be used with great care, but we will not go into that here.

[3] Indeed, if you have not already done so, you might like to read the following book, which gives a very good introduction to the history of mathematics and was written with the same ethos as this course: Jacqueline A. Stedall, *The history of mathematics: a very short introduction*, Oxford University Press, 2012.

[4] Jacqueline A. Stedall, *From Cardano's great art to Lagrange's reflections: filling a gap in the history of algebra*, European Mathematical Society, 2011, p. ix.

necessary). A useful structure that we will employ throughout is to consider the *context*, *content*, and *significance* of each text that we study:

Context: When, where and for whom was the piece written? What mathematical background does it assume?

Content: What does the text contain? Are there any parts that are particularly difficult or tricky? Is the argument convincing? How does it differ, if at all, from the way in which this mathematics is presented nowadays?

Contemporary Significance: How was this text received at the time it was written? Who read the text, or was influenced by it?

Historical Significance: What can this text tell us about the way mathematics was practiced at the time? How important was the text in the historical development of mathematics?

Indeed, 'context', 'content', 'significance' will be our mantra throughout both parts of the course.

Lecture course

In common with your other lecture courses in Michaelmas Term, this is given as a series of 16 lectures. The two mainstays of your mathematical education to date have been analysis and linear algebra, but the history of linear algebra can be slightly problematic (for reasons which we will explore in the course), so it is relegated to a single lecture near the end. The main thrust of the course is therefore the development of calculus, through to analysis, and eventually the birth of set theory. Nevertheless, other topics will appear along the way, such as algebra, geometry, and number theory. You will be assigned reading to do throughout the term; this reading will complement the material covered in the lectures.

In place of the problem sheets that you have for your other lecture courses, you will be set essay questions and be asked to prepare certain topics for presentation or discussion. The lectures are supported by four intercollegiate classes of an hour and a half each, to be held Fridays in Weeks 2, 4, 6, and 8. You will be asked to hand in essays (of 1,000 words) in advance of these classes, which will then be marked and returned to you for discussion in the class. In each class, we will deal not only with the content of the essays, bringing out any interesting points that people have made, but also with essay-writing techniques (on which, see below). You will also be expected to speak on the discussion topics that have been set prior to the class, and may also be asked to make a small presentation on a subject that you have been given. Overall, the intercollegiate classes should provide a forum for you to ask questions, try out ideas, or argue your point of view.

Reading course

In the reading course, we consider a particular topic in more depth, with the emphasis still on the use of primary sources: this will be an opportunity for you to apply everything that you have learnt in the lecture course. The topic this year is 'Communicating the Differential Calculus in

19th-century Britain', where we will look at the different ways mathematicians shared results with each other, including both published and unpublished texts. A number of core readings will be set, but the expectation is that you will go out and find additional materials for yourselves. Further details will be made available at the end of Michaelmas Term.

Your reading throughout Hilary Term will be supported by weekly discussion sessions of an hour and a half each; these will function very much like the classes of Michaelmas Term: as a place for you to ask questions and to discuss your findings. Three essays (each of 2,000 words) will be set during the term. As before, these will be marked and returned to you for discussion in the classes. These build towards the extended coursework essay.

Assessment

The lecture course is assessed by an exam in Trinity Term; the paper consists of two halves. The first is 'Extracts', in which you are invited to comment (usually under the headings of 'context', 'content', and 'significance') on a series of short extracts from historical mathematical texts: six are provided, from which you must choose two. The second part of the exam paper features a choice of essay questions, usually a selection of three topics, from which you must choose one. During the first half of Trinity Term, we will hold Consultation Sessions in which we will go through exam questions together.

The reading course is assessed by a 3,000-word extended coursework essay. The topic, related to the term's reading, is given out in the class in 7th week of Hilary Term; the essay is due in by 12 noon on the Monday of 10th week. The classes in 7th and 8th weeks are devoted largely to any questions you might have about the preparation of the extended essay.

Advice

Most of you have probably not written an essay since you were at school and you are likely to feel a little daunted the first time you attempt it. Nevertheless, you have opted to take this course, which means that you have already cleared the first hurdle — that of having the confidence to want to try. As already noted, you will eventually have to write formally assessed essays for this course, but don't worry — by the time you get to these, you will have had two terms' worth of practice and feedback for your essay-writing. To begin with, the following notes are intended to help you to get the most out of the course overall: for example, to read efficiently and to write well, skills which will never be wasted, whatever you go on to do in the future.

Reading and note-taking

Reading for pleasure is effortless, but if you really want to learn from what you read, you have to work at it. Reading without taking notes is largely a waste of time: you will simply find yourself coming back to the same chapter or article and having to digest it all over again, so get into the habit right from the start of thinking about and organising the material as you go

along. If you have the time, you might like to consider reading the material twice: once without taking notes to gain an overall impression, and then again (immediately) to make notes on the important points. The extra time taken to read through the material twice should be balanced out by greater efficiency in making notes.

We learn by creating images or structures in our minds which allow us to add or absorb new material. When you read, you need to work out what are the essential messages, the key points that you need to incorporate into your own mental model. This is a process you should be carrying out all the time you are reading, though it may take more than one pass through the material before you can sift out the most important issues. One of the purposes of the lectures (which will cover much of the same ground as the assigned reading) is to point out the major strands.

There are two ways of recording what you want to remember. One is to highlight words or sentences in the text. A serious drawback to this, however, is that the words you highlight are not your own. It is very much better to process the ideas through your own mind and hand, so the second and preferred method is, as you reach the end of each paragraph or section, to list the essential points from what you have read, either as bullet points or as a few short clear sentences. Such notes will not only help you to assimilate the material but will be an invaluable revision tool later on.

Always make a note of page or section references, so that you can find your way back to the relevant passages if you need to. Indeed, you may need to cite specific page or section numbers in your essays, so it is useful to have them to hand — an aspect of essay-writing that will be stressed below is the need for accurate bibliographies and references.

Writing an essay

An essay is your written response to a question that has been posed to you. It often helps to imagine your reader as someone who does not have all the information that you have but who is intelligent enough to follow your argument as long as you explain your ideas clearly. The following notes are intended to help you to create a fluent and readable essay; also, looking ahead, the following points reflect aspects of essay-writing that the assessors will be looking for when they come to mark your coursework.

- *Answer the question*

  Start by writing down the correct title in full, and refer back to it frequently as you read and plan so that you focus on what is relevant and avoid what is not. Make sure you address all the issues the title suggests. Even the most interesting and beautifully written essay will be marked harshly if it does not actually address the question at hand.

- *Research*

  Gather your information from reliable sources. Chapters from books or articles from respectable journals will have undergone a rigorous process of peer-review. This is not necessarily true of internet sources, which can vary wildly. Read the section below on 'Evaluating online resources' and consider just how many questions you need to ask

and answer before you can accept web-based information as reliable. You may think it less work to go back to books. Always cross-check the facts if you can and weigh up the evidence for yourself. Complete agreement between authors is usually rather dull, whereas differing views and opinions can be a good starting point for your own discussion.

- *Plan*

  Organise your thoughts carefully before you begin to write. Which parts of your material help to address the question? How are you going to arrange them? Give yourself two or three subheadings (but no more than that) and list the main points you want to make under each of them in a sensible order. Then write your essay around this outline.

- *Maintain a structure*

  All essays need a basic structure of beginning-middle-end. The beginning is your introduction: say what you are going to write about and why you consider it important or interesting. For a short essay this need be no more than a paragraph. The middle of your essay will consist of your subheaded sections, each containing explanations or arguments separated into paragraphs. Finally, you should draw the threads of the essay together and give your overall conclusion. Never introduce new ideas at this point. As with the introduction, the conclusion will usually be a single paragraph.

- *Show your understanding*

  Show that you understand the ideas you are writing about by expressing them in your own words. Quotes from secondary sources should be used only if they are absolutely essential (as a starting point for discussion, for instance), but not as a substitute for your own writing. Don't wander out of your depth – this can happen very easily in mathematics. There is nothing wrong with stating that certain topics are beyond the scope of your essay, but if you try to write about things you don't understand you will end up writing nonsense.

- *Support your opinions with evidence*

  An essay needs to present a convincing explanation or argument, just as a mathematical proof does. Don't make general statements unless you can support them with firm evidence, not hearsay or anecdote. The evidence might come from your reading of primary sources, or from other authorities (whom you must acknowledge). Where you observe different methods or opinions, present the strengths and weaknesses of each. You may in the end come down on one side or the other, but your reader should understand why. Remember that it is OK to disagree with the things that you have read, provided you can support your view in some way.

- *Make your essay easy to read*

  Aiming to write clearly will almost certainly help you to think clearly, whether you are doing mathematics or constructing an essay. Unless you are very confident of your writing style, keep to short sentences, and straightforward constructions. Use words you know

you understand, and that are appropriate for a formal essay. Try reading your essay aloud — to yourself or to a friend — to be sure it makes sense. Are there passages that you could rewrite more simply or more directly? Could some of your sentences be cut in two? Appropriate images or diagrams can help to illustrate a point but be sure they are relevant, not just decorations for your essay. Take care not to use too many footnotes, as these can be rather distracting for the reader (the present page may perhaps be taken as a case in point!).

- *Acknowledge your sources*

  Whenever you use evidence, arguments, or quotations from other people's work, you must acknowledge your source. This is an aspect of essay-writing whose importance cannot be stressed enough: think of the references in your essay as being like the proofs in your mathematical work — they cannot be left out. You can cite your references either by inserting a footnote,[5] or else by inserting the reference in brackets, for example: (Katz 2004, 216–232). In either case you need give only author, year, and page range, then at the end of your essay include a bibliography, giving full details of all the texts you have referred to — we will discuss the construction of bibliographies below.

- *Insert mathematics carefully*

  It is expected that your essays will contain some mathematics — how much to include will depend on the particular topic, and will require a judgement on your part. Any mathematics that you include should of course be accurate, and should be typeset in a consistent manner. Always use *italics* for mathematical letters. If you are using Word, several useful symbols, including Greek letters, can be found in the Insert/Symbol or Insert/Advanced Symbol menu.[6] For equations and formulae you can usually use Insert/Equation,[7] which will allow you to select symbols and build them into statements, but this is only satisfactory for very small amounts of mathematics. For more extended mathematical writing it is better to use LaTeX, which is not difficult to learn and gives a much more professional-looking document (these notes have been produced in LaTeX).[8]

- *Respect the word count*

  You should regard the word count not as your enemy, but as a very helpful indication of the required level of detail. If you have written too little, you may have missed out some key elements of the essay. If you have written too much, you may have strayed from the point you intended to make. A common pitfall is to use up too many words telling the reader what you are about to say, rather than just getting on and saying it.

[5] For example, Wallis 1656, 91–92.

[6] In other word-processors, such as Open Office, these symbols can usually be found in a similar place: for example, under Insert/Special Character.

[7] Again, in other word-processors, this feature will probably be somewhere similar.

[8] See the Mathematical Institute's guide to LaTeX: https://www.maths.ox.ac.uk/members/it/faqs/latex; introductory lectures on LaTeX will be held during Michaelmas Term. See also the advice on how to install LaTeX on your own machine: https://www.maths.ox.ac.uk/members/it/faqs/latex/getting-latex.

- *Proof-read*

  Proof-read your essay carefully for errors that your spellcheck will have missed, like 'form' for 'from'. Spelling of historical names can vary greatly; it is suggested that you follow the *Oxford dictionary of national biography* or the *Dictionary of scientific biography*. Book titles should always appear in *italics*, but article titles in 'single quotes'. In titles, capitalise only the first letter and proper names (this is a style known as 'sentence case').

- *Tidy up the details*

  Try to make your essay look good on the page. Make your name (or for formally assessed work, your candidate number) easily visible at the top of the first page. Make your title and subheadings clear but not elaborate. Give your essay breathing space: your reader will appreciate size 12 font, reasonable line spacing, and margins wide enough to write in. Avoid bad page breaks such as headings separated from their paragraphs, or breaks in the middle of a quote or a mathematical argument. Place figures and diagrams close to the relevant text or else on separate pages at the end; in either case give clear references: 'see figure 2', for example. Insert page numbers if they are not there already.

To help you to develop your own style, and of course to learn more about the history of mathematics, you might like to browse *The Oxford handbook of the history of mathematics* (OUP, 2009), which contains many examples of well-written articles about various aspects of the history of mathematics. The chapters are longer than most undergraduate essays but are nevertheless an excellent guide to structure, style, and layout. *Practice*, of which you will have much, is an important part of developing your style — to reiterate, every essay you write will receive detailed feedback, and essay-writing guidance will be part of each intercollegiate class.

Bibliographies

As noted above, a bibliography should be viewed as an absolutely essential part of your writing — essays that lack them will be marked harshly! Your bibliography should include all works referred to, listed in alphabetical order by name of the first author. For pre-twentieth-century books it is conventional to give place of publication; for modern books the publisher alone will suffice. There are many bibliographical styles in use in academic publishing, but the following formats are suggested.

Books:

John Fauvel, Raymond Flood, Robin Wilson (eds.), *Oxford figures: 800 years of the mathematical sciences*, Oxford University Press, 1999.

Victor J. Katz, *A history of mathematics* (brief edition), Pearson Addison Wesley, 2004.

John Wallis, *Arithmetica infinitorum*, Oxford, 1656.

Journal articles:

Eleanor Robson, 'Neither Sherlock Holmes nor Babylon: a reassessment of Plimpton 322', *Historia mathematica* **28** (2001), 167–206.

Web pages:

'Augustus De Morgan (English mathematician and logician)', *Encyclopaedia Britannica*, https://www.britannica.com/biography/Augustus-De-Morgan (accessed 21st August 2018).

A question that is often asked by those students who opt to write their essays in LaTeX is whether they should use LaTeX's built-in bibliography management tool, BibTeX. The short answer is: don't. BibTeX is a wonderful tool for writing large documents with lengthy bibliographies, but for short essays with only a handful of references, it is more trouble than it is worth — it is easier simply to edit your bibliography manually.

Plagiarism

Plagiarism is defined as the presentation of another person's thoughts or words or artefacts or software as though they are your own. Your essay should make clear to what extent any substantial section is derived from another source. Any exact quotation from published or unpublished works must be clearly identified, and you should give the source. Equally, if you summarise another person's (including a tutor's or lecturer's) ideas, judgements, figures, or diagrams, a reference to that person or the source should be made in the text and the source should be included in the bibliography. This includes material published on a website. The university maintains a useful webpage which contains advice on how to avoid plagiarism.[9] As you may be aware, the university runs samples of submitted coursework through the 'Turnitin' software, which compares the work with a database of relevant materials (drawn, for example, from online essay banks) to check for any matches.

A simple way to avoid accidental plagiarism is to be scrupulous in your note-taking. Write down all the details of the author, title, publisher, date, and page numbers before you start to read. Note the number of each new page or section as you get to it. Make notes in your own words, don't simply copy the author's. If you do quote word-for-word in your notes, then mark that quote explicitly, so that you do not inadvertently mistake it for your own.

Marking

When marking your essays, we will be looking at how well they address the given question, usually within the framework mentioned earlier: 'context', 'content', 'significance'. 'Context' and 'significance' will normally be given equal weighting, with a little less credit being given for the treatment of 'content', since this should be one of the easiest parts of the essay. Some consideration is given to presentation, though not to the level of penalising missing commas, for example: poor presentation usually goes hand in hand with poor understanding, so it is the latter that will lose you marks, rather than the former. Detailed marking breakdowns for assessed work will be included in the Notice to Candidates. You might also find it useful to read the relevant sections of previous Examiners' Reports.

The essays that you write during the course of Michaelmas and Hilary Terms (that is, the essays that are not formally assessed) will be marked according to the α, β, γ-system that is

[9] https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism?wssl=1

often employed in Oxford for marking tutorial work, but that is rarely explained. For the record, the available grades, in descending order of attainment are:[10]

$$\alpha,\ \alpha^-,\ \alpha\beta,\ \beta\alpha,\ \beta^+,\ \beta,\ \beta^-,\ \beta\gamma,\ \gamma\beta,\ \gamma^+,\ \gamma,\ \gamma^-.$$

The α, β and γ correspond roughly to the first, second and third classifications, but the purpose of this system is to stop you getting hung up on numerical scores, and to give you a more qualitative impression of how your work is progressing.

Preparing for discussions

Our classes in both Michaelmas and Hilary Terms will be very interactive affairs. They are intended as discussion sessions to which everyone is expected to contribute. The topics of the essays will be discussed, and you will also be given other subjects to prepare for discussion in the classes. In order for the classes to flow freely, it is important that you do indeed prepare these subjects — but you should already have covered these in the reading, so it should take only a little extra effort to ready yourself to discuss them out loud. Some people might be a little anxious at the thought of speaking in front of the rest of the class, but the key to gaining confidence in doing so is preparation: make sure that you are thoroughly familiar with the assigned topic, and you are unlikely to go wrong. You might find it useful to have a few relevant bullet-points noted down in front of you, which you can then volunteer at an appropriate moment. We genuinely want to hear everyone's thoughts on the material at hand, so don't be timid, and tell us what you think!

[10] The only reason that α^+ does not appear on this list is the fact that the online system into which we must enter these marks does not have α^+ as an option. Asymmetrically, γ^- *is* an option, but we would rather you do not make us use it.

Evaluating online resources*

*Adapted from notes originally compiled by Grazyna Cooper, formerly of OUCS.

1. Traditional evaluation criteria:
   - authority;
   - purpose;
   - coverage;
   - accuracy;
   - objectivity;
   - currency.

   Don't believe everything you read. Details to find out:
   - who hosts the webpage?
   - is the writer an authority on the subject?
   - why is the material online, and to whom it is addressed?
   - is the content accurate, reliable, objective, and current?
   - does the layout and design of the webpage support the information it contains?

   Critical parts of a webpage:
   - location (use the URL);
   - information in the header (title, author/publisher);
   - body (bibliography, CV included?);
   - footer (who maintains the page, last updated, etc.).

2. Authority, authors and sources of information:
   - who is the author of the source?
   - what is the author's job title?
   - is it clear whether some reputable organisation or expert is behind the resource or the author that you are consulting?
   - what are the author's qualifications for writing on the subject? (Does the author have a reputation in the field? What else have they written?)
   - is there any biographical information provided about the author?
   - does the author provide a contact address of any sort?

3. Purpose and audience:
   - why was the resource created: to inform, entertain, share information, advertise/sell, influence views, beliefs, etc.?
   - who are the intended users of this resource: general readers, students (any level?), specialists or professionals, researchers or scholars?
   - is it clearly stated for whom the resource is put together, at whom it is aiming?
   - what is the purpose of the resource? Is it clearly stated?
   - does the website fulfil the stated purpose?

4. Coverage, scope, and content:
   - what sort of document is it that you are looking at: a web-only page (such as a blog post), a journal article, a conference paper, creative writing, ... ?

- are the scope and limits of the document clearly stated?
- does the actual scope of the resource match one's expectations? (Ask yourself: 'is this useful to me?')
- if the resource being considered is useful, does it:
  - support the argument that is of interest;
  - counter the argument;
  - give interesting and useful examples;
  - provide information that can fruitfully be challenged or argued with?
- is the copyright situation clear?
- how reliable and free from error is the information?
- are there reviews of the site elsewhere to help you in your evaluation?
- how many other sites link to this one?

5. Accuracy:
   - can you verify the accuracy of this resource in any way?
   - is the methodology used in gathering information and assessing it stated by the author of this document and is it verifiable and/or clear?
   - are the data that support the argument or explain it included? Or can you find them easily for verification?

6. Objectivity:
   - is the information presented with a minimum of bias (political, ideological or other)?
   - are biases and opinions clearly identified or identifiable?
   - if the publisher or author is commercial, do business concerns affect presentation of the information?

7. Currency:
   - how stable is the resource?
   - when was the webpage produced, and is the original publication date clearly indicated?
   - when was it last updated?
   - is the resource regularly updated?
   - are the dates of any new material or updates (and frequency of updating) clearly stated?
   - how up-to-date are the links? How many of them still work?

8. Conclusions:
   - document the source to the fullest extent possible;
   - determine the stability of the source;
   - verify information using other sources.