

# Wikipedia Project

UNM Physics 452/581, Fall 2007

Instructor: Prof. Andrew Landahl

All students enrolled in the course for **graduate** credit must do a Wikipedia project on a topic in quantum information. Undergraduate students and auditing students are exempt.

The course's Wikipedia server, the "IQI Wiki" (pronounced "Icky Wicky") is at the following URL:

<http://info.phys.unm.edu/~alandahl/iqiwiki>

The main page has a link to a mini-tutorial by TA Brad Chase covering the very basics of how to construct a Wiki page. For information on how to add more elaborate features to Wiki articles, there are numerous tutorials within the main [Wikipedia](#) site and elsewhere on the web.

The article you write does not have to be very long, but should be two or more pages in length and include at least one picture. A good example is the IQI Wiki article on [Cluster State Quantum Computing](#) written by Brad Chase. You will also find numerous other quantum information articles, some good, some bad, on the web's two primary quantum information wikis: [Qwiki](#) (Caltech) and [Quantiki](#) (Cambridge).

**Important:** *Do not include a picture or text in your article that may be subject to copyright—all content on the IQI Wiki is subject to the GNU Free Documentation License.* In particular, that means you will have to either draw a figure yourself or use a picture that is clearly in the public domain. As with all scientific writing, please include citations as appropriate in your article. The IQI Wiki has a citations module added to handle just this sort of thing—again, see Brad Chase's article for an example of how to do this.

You are free to write about any topic in quantum information—it can be something covered in class, the textbook, or something you learned about elsewhere. You may write an article jointly with one or more other students, but your article should consequently be that factor more in-depth. In order to prevent the same article being written by multiple students or groups of students, please submit a proposed topic to me by **Thursday, November 15** for approval. Before doing so, please check that an article on your proposed topic doesn't already exist. The four places to check are [Wikipedia](#), [Quantiki](#), [Qwiki](#), and [Google](#). If an article does exist on one or more wikis somewhere, but in your opinion the article(s) could use substantial clarification or revision, feel free to propose the topic anyway and note in your proposal which article you plan to revise.

Once your topic has been approved, or even beforehand if you want to take a chance, go ahead and start working on your IQI Wiki article. You can revise it many times—no need to be bashful. Although I haven't enforced it through software, please log in as yourself when you edit and only edit your own work. Once your article is finished, you can also submit it to one of the aforementioned wikis: Wikipedia, Quantiki, or Qwiki. Submitting your article to a worldwide wiki is not required, but you might as well do so after having done the work to write it—donating your article is a valuable service to the community and I encourage it.

Be warned, however: once you submit your article to one of these wikis, it may be ruthlessly edited by others—there is no sense of “ownership” of articles on Wikipedia.

A final version of your IQI Wiki article is due on **Thursday, December 6**. You can continue to edit your article afterward, but I will be grading the December 6 version. As noted in the Course Syllabus, the IQI Wiki article is worth 10% of your grade.

Each student writing an IQI Wiki article is required to give a brief 10-minute presentation in class on his or her article. A computer will be hooked up to a projector, so if you are presenting, please style your presentation as a walkthrough of your article, hitting the highlights of the topic. Please do not just read your article aloud—give some context and enough of a teaser so that others may want to read your article more carefully later. This presentation is worth a separate 10% of the course grade. Presentations will begin on the last day of class, **Thursday, December 6** and will continue through the time allotted for the final exam for the course on **Tuesday, December 11**. Notice that the day that the article is due is the same day as the first day of presentations. **Avoid the temptation to work on your article up to the last minute and neglect work on your presentation. The presentation is worth just as much as the article itself. Practice your presentation ahead of time if possible!**

To help get you started, below is a list of possible topics. Again, you do not have to choose from this list, but you can if you'd like to.

- Circuits, Algorithms, and Models of Quantum Computation
  - Universal quantum gate basis (include examples)
  - Solovay-Kitaev algorithm/quantum compiling
  - Quantum algorithm for the collision problem
  - Quantum algorithm for the element-distinctness problem
  - Quantum algorithm for the ordered-search problem
  - Quantum algorithm for the NAND-tree problem
  - Adversary method for quantum query complexity lower bounds
  - Polynomial method for quantum query complexity lower bounds
  - Continuous-time quantum walk
  - Adiabatic quantum computation
  - Cluster state quantum computing (already taken)
  
- Error correction
  - Five- and seven-qubit quantum codes (two articles of half-length)
  - Bacon-Shor code
  - Quantum subsystem codes
  - Quantum toric code

- Quantum Hamming and Singleton bounds (two articles of half-length)
- Cryptography
  - Quantum digital signatures
  - Quantum coin tossing
  - Quantum secret sharing
  - Quantum data hiding
  - Quantum Byzantine agreement
- Communication
  - Quantum data compression (Schumacher compression)
  - Approximate quantum cloning
  - Unextendible product bases
  - Mutually unbiased bases
  - Symmetric Informationally Complete POVMs
  - Holevo’s Theorem (expand quantiki article)
  - The “Pretty Good Measurement”
  - Tsirelson’s inequality (major rewrite of Wiki article)