

# Science in the Key of Life

Fall 2016 STSH 4580 Tues-Fri 10-12, Sage 4112. Instructor: Ron Eglash

**.“Those who died, they are like us. ... They would rather that the wonders of science be focused on improving life and not eliminating it.”** -- [Barack Obama, Hiroshima Peace Memorial](#), May 27 2016.

## **To contact instructor:**

Office Hours: Mon 2:00-4:00 and by appointment, 5502 Sage. Email: [eglash@rpi.edu](mailto:eglash@rpi.edu), phone: 276-2048. Course webpage: [www.rpi.edu/~eglash/eglash.dir/skl.html](http://www.rpi.edu/~eglash/eglash.dir/skl.html)

## **Description**

Science seems to be tuned in the key of death: it invents ever more deadly weapons; “accidently” causes environmental devastation; and allows the wealth inequalities at the root of race riots, terrorist movements and poverty-driven crisis. What does science look like when played in the key of life? Students will examine the concept of “tuning” in various frameworks; learn how to apply this analysis as a critique of current scientific and technological practices; and how to envision and articulate alternative practices that bring us closer to a just and sustainable future.

## **Learning Outcomes**

- Students will be able to reflect on a cross-disciplinary conception of tuning in their written discussion notes.
- Students will be able to apply these basic understandings across the STEM/Humanities divide in their short essays.
- Students will be able to conduct a research project in which they investigate some aspect or example of tuning across disciplines.

## **Academic Honesty**

While ideas are available to everyone, credit for ideas, and the particular text used to express them, belongs to their originator. Plagiarism occurs when a student attempts to pass the ideas or words of someone else as their own. It is surprisingly easy to do. For example, students who are not writing in their first language will sometimes try to use a sentence from another written text, simply

because they are worried about their grammar. Plagiarism also occurs when a quotation is reworded in an attempt to avoid citation—always make sure the sources of your quotations are specifically cited. The internet makes plagiarism particularly tempting, since you can copy and paste from the web to your paper. Recycling your own paper from another course would not be plagiarism, but it would be academic dishonesty and thus subject to the same penalties, which include failing the course (a grade of “F”).

### **Special Needs**

Please contact me if you have special needs such as disability or religious holidays.

### **Requirements:**

Evaluation will be based on the 4 short “reading reflection” papers (10% each), the research project paper (30%), the research project presentation (10%), and [class participation](#) (20%). Note that the syllabus tells you the reading that will be discussed for that day. You need to have done the reading before you arrive, and you are required to bring the reading to class so that we can discuss the texts in detail. To get participation credit for a class meeting you are required to be physically present, AND post a discussion question or comment on our board [here](#). Always bring your laptop as well to play with simulations and other tools.

### **Short papers and research project:**

Short “reading reflection” papers should be about 5 pages (double-spaced, with proper citations); these allow you to demonstrate your understanding of the material. The final research project paper should be 8-10 pages (double-spaced, with proper citations); the instructor will help you find a suitable topic for your research. Research projects can be done by groups, in which case the paper will be longer, and each individual is responsible for a different section of the paper. Working in a group is a great way to bring together more than one discipline (eg math and anthropology, or computing and environmentalism). Research project presentations may also be done by the group.

### **Course Schedule:**

August 30: what are we tuning for?

What are we tuning for? A brief example of what technoscience does wrong, and yet how its correction cannot be simply anti-science. Compare Specter, M. "[Seeds of Doubt](#)" and Shiva "[Women and the gendered politics of food](#)". Don't forget to post a discussion question or comment on our board [here](#).

In class:

[Intro](#);

[Waves and tuning](#)

## Part I Tuning and music

Sept 2: music as a social technology in the african diaspora

Discuss three readings:

- 1) Introduction (pg 5-15) in [African vibrations : the percussive approach in hiphop music](#) (optional: the rest of the dissertation);
- 2) the [neuroscience of trance](#) (one page; optional: linked article in Cerebral Cortex);
- 3) "section 3 analog representation" in [The Race for Cyberspace](#) (optional: the rest of the essay).

In class: Compare auditory phase shift ([http://csdt.rpi.edu/latino/rhythm/Rhythm\\_Wheels.exe](http://csdt.rpi.edu/latino/rhythm/Rhythm_Wheels.exe) for windows) with visual phase shift (see "section 3 analog representation" above).

Sept 6: music as a social technology in India part 1

Meet in West Hall for sitar tuning with Prof. Curtis Bahn. Discuss Reading 1: [Sacralising the city: Sound, space and performance in Hindu ritual practices in London](#). Reading 2: [the Singapore government's explanation for why Indian music can be banned but not Chinese](#).

Sept 9 music as a social technology in India part 2

Field trip to the Albany Hindu Temple. Meet at student union "horseshoe" at 10:00. Discuss reading: Briefly familiarize yourself with [Spiritual Aspects of Hindustani Indian Classical Music](#) but no need to add comments to the board.

## Part II Tuning in design

Sept 13 Intro to tuning in design philosophy

Paper 1 due

Discuss readings:

- a. Heidegger, brief [excerpt from "The Fundamental Concepts of Metaphysics."](#)
- b. [Coyne Introduction \(pp. xv to xxviii\)](#)
- c. Mark Johnson, ["Alfred Schutz and Social Media"](#)

In class:

Heidegger: <https://www.youtube.com/watch?v=A04RhtR0imY>

Sept 16

Discuss reading: [Coyne chapter 3](#)

In class:

Beat frequencies in time: <https://academo.org/demos/wave-interference-beat-frequency/>

Moire is beat frequencies in space: <https://community.csd.t.rpi.edu/projects/994/run>

Sept 20

Discuss readings: Pickering, Introduction to “[The Mangle in Practice](#).”

For missing images see Mondrian [here](#) and Kooning [here](#).

### **Part III Cybernetics: a science of tuning?**

Sept 23

[The cybernetic brain chapters 1-2](#)

Second paper due

Sept 27

[The cybernetic brain chapter 3](#) (optional to read chapter 4 as well)

Sept 30

[Cybernetic brain chapter 6](#). (optional read ch 5 as well). Note: On US backing of the 1973 military coup in Chile see [https://en.wikipedia.org/wiki/Augusto\\_Pinochet#U.S.\\_backing\\_of\\_the\\_coup](https://en.wikipedia.org/wiki/Augusto_Pinochet#U.S._backing_of_the_coup).

Oct 4

[Cybernetic brain chapter 8](#) (optional read ch 7 as well)

Oct 7.

Norbert Wiener retrospective

<http://www.theatlantic.com/technology/archive/2014/06/norbert-wiener-the-eccentric-genius-whose-time-may-have-finally-come-again/372607/>

Weiner from a CS perspective:

[Norbert Wiener and the Counter-Tradition to the Dream of Mastery](#)

Oct 11. No class (Monday schedule due to Columbus Day)

### **Part III: Out of tune: defining problems**

Oct 14 Technology induced wealth inequality:

Robots and AI eliminates jobs <https://www.technologyreview.com/s/515926/how-technology-is-destroying-jobs>

Eliminated jobs creates inequality: <https://www.technologyreview.com/s/531726/technology-and-inequality>;

Paper 3 due

Oct 18 Technology induced health inequality

Global health [https://www.researchgate.net/publication/271330328\\_Income\\_inequality\\_and\\_health\\_A\\_causal\\_review](https://www.researchgate.net/publication/271330328_Income_inequality_and_health_A_causal_review)

Factory worker health: <http://www.wired.com/2015/04/inside-chinese-factories/>

Video: [Wealth Inequality creates health inequality](#)

Oct 21 Technology and terrorism

[Terrorism, Communication and New Media: Explaining Radicalization in the Digital Age](#)

Oct 25

Developing world:

Taussig, [The Genesis of Capitalism amongst a South American Peasantry: Devil's Labor and the Baptism of Money](#)

The Guardian: [The microfinance delusion](#)

### **Part IV: re-tuning**

Oct 28

Dobe !Kung chapters 1-3

Paper 4 due

Nov 1

Dobe !Kung chapters 4-6

Nov 4

[An introduction to Generative Justice](#)

- [GJ exercise](#)

Nov 8

Dotson and Wilcox: [The Production and Circulation of Value in Community Energy Initiatives](#)

Nov 11

Biopiracy and the Innovations of Indigenous Peoples and Local Communities:

<http://press-files.anu.edu.au/downloads/press/p154251/pdf/ch04.pdf>

[https://www.academia.edu/26229368/African\\_Orature\\_as\\_Ecophilosophy\\_Tuning\\_in\\_to\\_the\\_Voices\\_of\\_the\\_Land](https://www.academia.edu/26229368/African_Orature_as_Ecophilosophy_Tuning_in_to_the_Voices_of_the_Land)

Nov 15

Food Sovereignty for Poor Countries in the Global Trading System: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2002244](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2002244)

Nov 18

Global monoculture and violence: <http://tikkun.dukejournals.org/content/30/3/34.full.pdf+html>

Nov 22

Tuning education in south africa: [http://www.education.uct.ac.za/sites/default/files/image\\_tool/images/104/framingthefield.pdf](http://www.education.uct.ac.za/sites/default/files/image_tool/images/104/framingthefield.pdf)

Nov 25 thanksgiving

Nov 29

Culturally responsive STEM education

Gutstein, [Teaching and Learning Mathematics for Social Justice in an Urban, Latino School](#)

- [Signup for presentations](#)

Dec 2

Saving Human Lives: What Complexity Science and Information Systems can Contribute

<http://link.springer.com/article/10.1007/S10955-014-1024-9>

Dec 6

Student presentations

Dec 9

Student presentations

Final paper due