Genomics in the Classroom: What it is and why it matters

Course Syllabus

CEED (PSU) Course (2 credits) | CEED administrative cost ($120)

Course Description and Rationale

“Genomics”—defined as the study of the functions and the interactions of all the genes in living organisms, including their interactions with environmental factors—is an area where people of all ages lack the background to understand and evaluate the new popular press headlines reporting genomics-based research. As genomics continues to influence healthcare and our fundamental understanding and manipulation of the world, it is becoming vitally important for everyone to have a basic understanding of the genome sciences and technologies, and the ethical, social and policy ramifications of their application. This is especially true for high school students who always will be the beneficiaries of the promise of genomics in their future.

Instructor:
Gregory Fowler, PhD, Affiliate Associate Professor, Department Public Health & Preventive Medicine, Oregon Health and Science University | Senior Research Associate, School of Community Health, Portland State University

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Learning Objectives
Using the online computer platform Google docs this course is structured to provide high school life science instructors with a basic understanding of the emerging field of genomics in nine topical areas—as described at the website: “Genomics for Everyone” (GFE)—in order to:

Gain familiarity with the history, terms, techniques and background needed to understand and critically analyze the rising tide of DNA (Genomics)-based stories as reported in the popular and scientific press;

Understand the interplay of how scientists are coming to make sense of genomic information and how they are applying this information to genomic technology in contemporary medicine and health care; and

To identify and reflect on the social, ethical and policy issues raised by genomics and their implications and challenges for how the “genomic revolution” will affect our personal (and genetically-related family) lives in humane and just ways.

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**Week 1 (06.20-24)**

Depending on numbers of course enrollees—and topical interest—teachers will be divided into groups for each of the (above) nine GFE teaching modules (e.g., 18 teachers = 2 per topic).

Focusing on the text of each module—including the “Resources” and “Questions for Discussion” sections—individual groups of teachers will translate their own
understanding of a given topic (along with suggested activities and/or tools. See: Let’s Get Healthy) into a first draft of a “Genomics Primer” to share online with other course participants, refine, and eventually use in their own classrooms, and by colleagues elsewhere; A kind of “teachers teaching teachers” endeavor.

On Friday, 06.24 an all-day field trip to two OHSU research labs will occur designed to highlight two of the hottest areas of current genomic research: Cancer and Epigenomics (GFE teaching modules 7 and 8, respectively)

Joe Gray (Cancer): See: The Cancer Genome Atlas
Kent Thornburg (Epigenomics): See: Understanding Epigenomics

Note: For enrollees outside the Greater Portland area and unable to attend the live sessions, alternate arrangements may be made upon request.

Week 2 (06.27-07.01)
Refinement and editing of the “Primer in Genomics for High School Students” will continue throughout the week. Individual group efforts will be coordinated online by the course Teaching Assistant, Nitya Janardhan.

The final draft of each of the nine topics must be completed and emailed to the course instructor no later than the following Monday, 07.03. That draft of the “Genomics Primer” will constitute the final exam in the course.
The final grade in the course for each participant will reflect the quality, creativity and potential usefulness of that document for its intended classroom use during the following AY 2016-17, and beyond.

The course instructor (and T.A.) will provide specific criteria for organization and content. In general, however, each of the modules in the classroom genomics primer must include discussions of genomic science in the context of both ELSI (Ethical, Legal, and Social Implications) and health policy issues as laid out in the student-generated Legislative Briefing Book, "Shaping Public Health Policy in the Age of Genomics".

As for ideas for classroom activities and learning tools, check out the various options/ideas available at the National Human Genome Research Institute (NHGRI) website.

**About the Instructor**

Greg Fowler is currently affiliated with the graduate teaching faculties in the School of Community Health and the Department of Public Health and Preventive Medicine at Portland State University and Oregon Health and Science University, respectively. In 1985 he received an “Ethics and Values in Science and Technology” joint research grant from the National Endowment for the Humanities and the National Science Foundation. In the intervening 30 years he lectures and writes on the subjects of science education and literacy, the societal implications of science and technology, and informed “civic governance.” He received his Ph.D. from Brown University.