



Interpret a Genome for Education

Undergraduate Research in Microbial Genome Annotation

Research that uses contemporary bioinformatics tools.
Research that is inexpensive, readily accessible and scientifically relevant.

The DOE Joint Genome Institute's Education Program provides opportunities for colleges and universities to investigate recently sequenced bacterial genomes, such as those sequenced as part of the Genome Encyclopedia of Bacteria and Archaea project (GEBA), for analysis by undergraduates.

- Students can analyze the six open reading frames for a given fragment of DNA, compare the results of various gene calling algorithms, assign function by sequence homology, and use gene ortholog neighborhoods for comparative genomics and annotate biochemical pathways, while learning the underlying biological concepts in a variety of science courses.
- In introductory biology courses, students can annotate individual genes. Biochemistry courses can annotate fundamental metabolic pathways, whereas in microbiology, pathways, structures, and systems characteristic of the organism's lifestyle will be traced. Novel genes and pathways can be discovered by examining clusters of hypothetical proteins in a comparative genomics context (that will include phylogenetic profiling and ecological considerations), perhaps in an undergraduate course dedicated to bioinformatics.

All bacterial genomes are full of novelties; moreover, the GEBA organisms are relatively unusual and from poorly investigated parts of the tree of life, so the likelihood of exciting discoveries and interesting variations on the classical pathways is high. The JGI believes that involving students in annotation in a calibrated, stepwise way will provide a new research-based approach to teaching fundamental concepts in the life science curriculum.





Educational Resources Available Through IMG-ACT/edu portal

- Class management tutorials
- Detailed instructions on using applicable bioinformatics tools
- Online lab notebook and lab report for collecting data
- Sample course syllabi
- Sample student posters and Powerpoint slides
- Discussion boards and access to experienced IMG-ACT/edu practitioners
- Assessment surveys

Timetable

- Apply to participate in the JGI's IMG-ACT/edu training workshop (individuals or teams) at <http://www.jgi.doe.gov/education/genomeannotation.html>
- Apply to receive a travel grant to the IMG-ACT/edu workshop through the Microbial Genome Annotation Network (MGAN) (contact Lori Scott, see below)
- Participate in the yearly January training workshop at the JGI Headquarters in CA, or request a regional workshop
- Request a genome to interpret – available genomes can be found at <http://www.jgi.doe.gov/education/adoptagenome/index.html>
- Integrate genome annotation into your curriculum using the IMG-ACT/edu bioinformatics portal

Contact Information:

- For more information about the Interpret-a-Genome Project and the IMG-ACT/edu portal, contact Dr. Cheryl Kerfeld, (Education/Structural Genomics Division, Joint Genome Institute) at CKerfeld@lbl.gov.
- For more information about travel grants to the IMG-ACT/edu workshops (sponsored by the Microbial Genome Annotation Network), contact Cheryl Kerfeld or Dr. Lori Scott (Biology Department, Augustana College, Rock Island, IL) at loriscott@augustana.edu.

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