



Application Form

Applicants should return the following **information** and a **resume** by February 1, 2012. Selected applicants will subsequently work with their chosen faculty member to shape their research projects prior to the beginning of the summer intership period.

Name: _____

Email: _____

Home Address: _____

Home Phone: _____

District/Employer: _____

Position/Grade Level: _____

Administrator Signature: _____

Social Security #: _____

Please submit a **resume** and **answers** to the following questions on a separate sheet of paper:

1. How do you think your teaching and/or your students' learning opportunities will be enhanced by this experience?
2. Which topics are you interested in and why? (Rank a 1st and 2nd choice.)
3. Describe any relevant laboratory or other research experience you have previously participated in.

Please email/mail/fax completed form and resume by February 1, 2012, to:

Ellie Rice, Department of Biology
Franklin & Marshall College, P.O. Box 3003
Lancaster, PA 17604-3003
Fax: (717) 358-4548 Phone: (717) 355-4681

Time Commitment

Selected fellows will work on their projects 40 hours per week from Monday, June 11, to Friday, July 20, 2012. Modifications to this schedule can be arranged with the faculty mentor.

Financial Benefits

This partnership is supported by a grant from the Howard Hughes Medical Institute to develop college and community resources in bioinformatics. Therefore, there is no cost to project participants.

Participating teachers will receive a \$5,000 stipend for their work.

Fellowship Locations

Research activities will occur at both Franklin & Marshall College and at the Clinic for Special Children.

Franklin & Marshall College
628 College Ave
Lancaster, PA 17603

The Clinic for Special Children
535 Bunker Hill Road
Strasburg, PA 17579

For more information about Research Fellowships, contact Ellie Rice at (717) 358-4681

Or log on to:

<http://www.fandm.edu/bioinformatics/summer-research-fellowships>



FRANKLIN & MARSHALL

CLINIC FOR SPECIAL CHILDREN

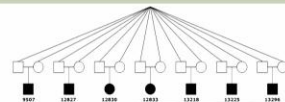
HHMI

Lancaster-Lebanon
Intermolecular Unit
iui3
An Educational Research Alliance

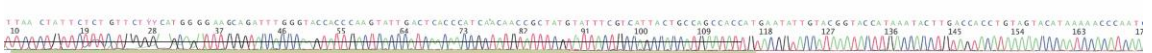
Franklin & Marshall and the Clinic for Special Children
in partnership with IU13 present:

Summer Research Fellowships in Bioinformatics

6 WEEKS:
JUNE 11 - JULY 20, 2012



FRANKLIN & MARSHALL
CLINIC FOR SPECIAL CHILDREN
HHMI
iui3



Bring Scientific Research into your Classroom with a Summer Research Fellowship in Bioinformatics at Franklin & Marshall College

"You get to work in the lab and do some real, actual research. It's not like the lab to get practice... you're actually doing research and trying to solve a problem... it's awesome!" -- 2009 Fellow

- Engage in authentic scientific research while working side-by-side with a Franklin & Marshall faculty member.
- Take advantage of this chance to engage in science processes while expanding your knowledge of Biology, Genetics, Medicine, Computer Science or Applied Math.
- Spend six weeks in partnership with a faculty member developing, implementing and presenting your own research project.
- Receive a \$5000 stipend for your hands-on immersion experience with the process and culture of modern scientific research.
- Enhance your knowledge by using cutting-edge tools in bioinformatics. Learn about new concepts and techniques in biology, and how they impact everyday life.
- Extend the benefits of your expanded experience with the nature of science to your own students.

Genomics

Comparative Genomics of Plant Disease:



Working with Professor Jaime Blair, you will use a variety of bioinformatics tools to study the evolution of disease-causing organisms. You will take advantage of the complete genome sequences currently available from fungi, oomycetes, and other eukaryotes to explore phylogenetic relationships. Traditional "wet lab" approaches will be used to generate new data. You will also associate genomic changes with patterns of host specificity, virulence, and speciation.



Medical Genomics of the Plain People:

Take advantage of the unique opportunity to work with pediatricians Dr. Holmes Morton and Dr. Kevin Strauss as they provide comprehensive medical care for children with chronic, complex medical problems due to inherited disorders. You will work with geneticist Dr. Erik Puffenberger to characterize the genetic basis of diseases found in the Old Order Amish and Mennonite communities in Pennsylvania. Utilize the tools of bioinformatics and genomics in an effort to improve treatment and outcomes for children who suffer from rare inherited disorders.

Mutations Causing Human Disease:



Work with Professor Rob Jinks to investigate how mutations in genes cause human disease. Working with several disease-causing gene variants identified at the Clinic for Special Children, you will clone genes and investigate their function with a variety of techniques.

You may study gene expression in tissue culture, or with physiological localization studies. You may study the protein-protein interactions involved in a gene's biochemistry. You will use the databases and tools of bioinformatics to understand the location, diversity and function of the genes you investigate.

Genomic Identification of Bird Diseases:

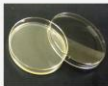
What aids the birds? You will utilize genomic tools to identify pathogens working in the blood of swallows while working with Professors Dan Ardria and Ellie Rice. You will test hypotheses relating to whether disease exposure varies geographically and use lab techniques—including DNA extraction and PCR amplification and gel electrophoresis—to investigate swallow species from all over the world. You will also use computer-based tools to mine public databases in order to design PCR primers that will identify bird pathogens.



Proteomics

Genetic Causes of Colon Cancer:

Investigate the genetic cause of colon cancer with Professor David Roberts. A particular gene is mutated in greater than 80% of all colon cancer cases, but how do mutations in this gene actually cause uncontrolled growth? You will work with human cell lines and systematically mutate individual amino acids to see which are critical to the protein. Tools and techniques will include PCR, gel electrophoresis, and database tools like BLAST and sequence



Protein Interactions of Immunity and Inflammation:



Working with Professor Beckley Davis, you will explore protein interactions involved in immune response and inflammation. The MHC (Major Histocompatibility) genes are the most highly polymorphic genes in vertebrates. The proteins encoded by these genes are responsible for transplant rejection and immunological memory. Using bioinformatics, PCR, and phylogenetics you will explore the evolution of these genes in mice. Or you could use site-specific mutagenesis to explore how NOD2, an important gene for inflammation, functions normally and during dysregulation as seen with Crohn's disease and Blau syndrome. A third option would allow you to screen for proteins that bind to NLR5, another important immune-related protein, using a large-scale yeast two-hybrid screen.

Biochemistry of Stress in Mussels:

In Professor Peter Fields' lab, you will have the opportunity to combine classical "wet-bench" biochemical techniques with bioinformatics tools to explore how marine invertebrates respond to environmental stress. You will use lab techniques like electrophoresis and mass spectrometry to discover proteins and metabolic pathways important for stress protection. You will use gel image analysis software to quantify changes in protein expression in tissues, as well as bioinformatics software to identify proteins from nucleotide and amino acid sequence databases.

