14th year

2017 Summer Biology Experience

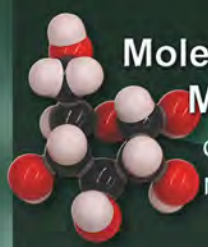
Discover the Possibilities

10 intense days

June 19-June 28
July 6-15

The Summer Biology Experience (SBE) is a series of hands-on activities integrated with multiple threads of STEM concepts to develop a firm foundation for designing and executing experiments. Participants use these skills in the preCollege Research Opportunies (PRO) program and have the opportunity to compete for significant awards.

Molecular Models



Glucose $C_6H_{12}O_6$

Molecular Weight

moles

molarity,
% by weight

Measuring Concentration

Spectrophotometer

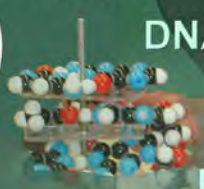
★ Challenge Lab

Solution Chemistry & Molecular Properties

Ionization of Functional Groups

$$pH = pK_a + \log\left(\frac{[B]}{[A]}\right)$$

$$pH = -\log(H^+)$$



DNA

Amino Acids

Proteins

Folding of Proteins
Hydrophobic, Hydrophilic Interactions

Molecular Separation Techniques

Electrophoresis, Isoelectric Focusing,
Gel Filtration, & Ion Exchange Columns

★ Challenge Lab

Determination of Molecular Weight

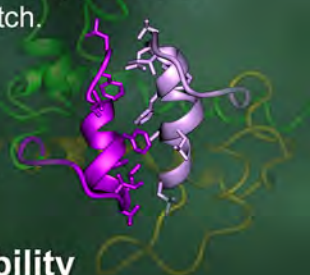
Chemistry Concepts & Basic Laboratory Skills

Students are taught basic concepts and lab skills; Molarity, making solutions, pH, pKa, buffer systems and ionization of functional groups.
Use of balances, spectrophotometers and pH meters.
All students make solutions from scratch.

$$A = -\log\left(\frac{\%T}{100}\right)$$

Beer's Law

$$A = \varepsilon_\lambda \times C \times \ell$$



Molecular Modeling & Spatial Ability

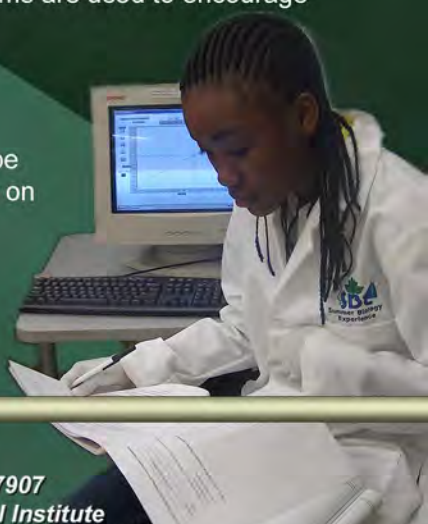
Students learn the molecular structures by building models. Students learn PyMol™ and Photoshop™ to visualize and enhance protein structures from real coordinates.

Communications: Writing and Visualization

Students compose a paper and poster on the structure and function of a protein and illustrate with origin graphics.

Computational & Critical Thinking Skills

Software and challenge problems are used to encourage problem solving strategies.



Eligibility: Students from 6th to 12th grade are selected based on their interest in research, teacher recommendations and a face to face interview. Program costs may be covered by grants and donations. Room and board students are chaperoned and stay on campus. Parental approval is required for all students. Contact Director at Purdue.

PURDUE UNIVERSITY

http://www.bio.purdue.edu/outreach

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Biological Sciences, Purdue University, West Lafayette, IN 47907
Originally developed and supported by the Howard Hughes Medical Institute

Congratulations!

Indiana Teachers and Top Winning Students

Special Congratulations *Arjun Ramani,*
Top 40 STS Finalist, Regeneron Science Talent Search
"Fast Sampling of Stochastic Kronecker Graphs
by Identifying Erdos-Renyi Subregions"
Teachers, West Lafayette Junior- Senior High School &
David Gleich, Computer Science, Purdue University

International Science & Engineering Fair
Top Row: Arjuyn Ramani (2nd Place Mathematics), Bowen Jing,
Sepehr Asgari (3rd Place Microbiology) & Taj El-Khalili
Front Row: Lucy Smith, Jenny Wang (4th Place Earth &
Environmental Sciences), Annie Ostojic, & Jooyoung Rosa Lee

Arjun Ramani, Bowen Jing, Jenny Wang & Rosa Lee
Teachers West Lafayette Junior-Senior High School
Jenny Wang - Suilan Zheng, Philip Low Purdue University,

Taj El-Khalili, Teacher Lynn Sneider, Harrison High School,

Sepehr Asgari, Teacher Jacob Fitzgerald, Carmel HS,

Annie Ostojic, Munster HS

Annie Ostojic (Munster, IN)
2016 Grand Prize Broadcom Masters
2016 Top Indiana Scientist, Junior Division

Left to Right: Bowen Jing (West Lafayette, IN),
Varkey Alumootil (CA), Boyang Peter Dun (Fort Wayne, IN) &
Thomas Xiong (TX)
Indiana had 3 of the 20 FinalistS for the 2016 USA BioOlympics.
Not shown is Xuchen Wei, National Finalist, Carmel, IN.

preCollege Research Opportunities

Students interested in gaining research experience can participate in the preCollege Research Opportunities program (PRO) at Purdue University. Students have the opportunity to independently select, design, and execute their own set of experiments in a special laboratory in the Department of Biological Sciences. A BSL2 lab (Biosafety Level 2 Lab) in this facility allows the opportunity to culture microorganisms and cell lines unavailable in high school labs. Students use state-of-the-art molecular biology techniques. Experiments do not have to be biological in nature, nor is competing in the Science Fair a requirement. Most students design their experiments to compete in their local Science and Engineering Fair, and have the opportunity to compete for awards. Previous PRO participants have a significant record of success.

Students are selected by demonstrating interest and/or prior participation in the SBE. Parental approval is required. All research requires the Director's approval and in some cases the approval of Purdue University. This program operates year-round on weekends, after school, during holidays/breaks and the summer.

Contact Dr. Clark Gedney, Director, in the Department of Biological Sciences at Purdue University, cgedney@purdue.edu or text 765-404-0425.