PennState College of Engineering
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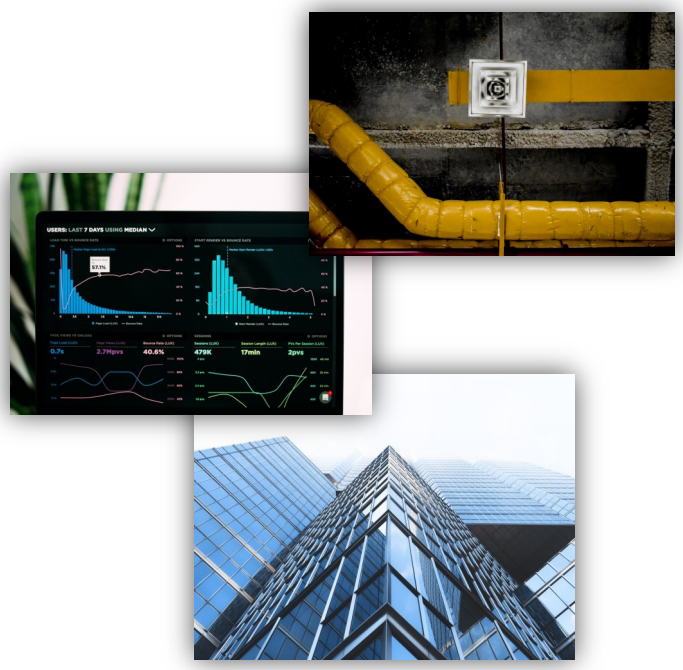
PennState College of Education

CSATS Center for Science and the Schools

Building Education Research Experience for Teachers

June 15 — July 31, 2020



During this 7-week full-time research experience, teachers will work alongside of a faculty member to design sustainable building systems that promote environmental health and energy efficiency for existing structures. Research topics include: indoor air quality, lighting effectiveness, thermal comfort, and energy efficiency. Teachers will use their research experience to co-design a unit of study to enhance their current curriculum using their schools as "living laboratories." ***Check out sample research placements on the next page!***

Target Audience: Secondary science, technology, engineering, or math teachers with at least 3 years of teaching experience.

Teacher Benefits:

- Teachers will receive a $5,000 stipend for completing their summer research experience.
- Teachers will receive up to $1,000 for materials to implement their classroom research project.
- Teachers will receive a $1,500 stipend for implementation of their classroom research project. Online follow up and support will be provided during the academic year.
- Teachers will have the opportunity to present their research and classroom research projects at the MJ Murdock Partners in Science Conference in San Diego in January 2021. Teachers will receive some travel expenses to attend.

To apply visit csats.psu.edu

For more information, contact: Matt Johnson at mmj125@psu.edu

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Sample Lab Placements for Building Education Research Experience for Teachers

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RICHARD MISTRICK'S LAB

The teachers will study the performance of day-lighting systems and electric lighting systems for the purpose of computing both energy savings and circadian light exposure of different daylighting, shading, photocontrol, and spectral control strategies. The teachers will develop models in CAD, run daylighting simulations, and develop computer code and/or spreadsheet solutions to study different lighting, shading, and control scenarios. These studies will involve a study of their school classroom and/or other workspaces.

GREG PAVLAK'S LAB

The teachers will develop computational models that link smart building control technologies with energy, economic, and environmental performance indicators. The models will be applied to quantify energy, economic and environmental benefits and trade-offs that might exist in designing and deploying smart building control systems. Teachers will model a variety of building types using detailed physics-based energy modeling software EnergyPlus. Building models will be coupled with mathematical optimization routines written in MATLAB or Python to control the energy systems within the building(s).

JULIAN WANG'S LAB

The teachers will understand the main strategies of passive solar design for buildings, in terms of solar energy features, solar heat utilization, climate and site, etc. Based on the knowledge learned, they will focus on efficiency of windows. The teachers will know the basic window optical and thermal properties and their functions for potential building energy savings. In the last session of this project, they will develop a simple Arduino-based sensor module which can be used to measure the window properties on-site. Through this project, the teachers will gain the basic knowledge of solar energy, passive design strategies, Arduino sensor fabrication, in situ measurement method for windows, and window energy impacts, which they can apply and promote in their classrooms and in their daily lives.

NATHAN BROWN'S LAB

Participants in this project will assist in a study that considers how architects and engineers interact with computational design software to make design decisions. Increasingly, architectural engineers are using computer code to generate different options for a potential building (or building component), and then compare these options quantitatively. During this project, teachers will help set up building performance models, run simulations of building geometry, and analyze the resulting data to determine trends and desired outcomes. Teachers will gain valuable skills in a visual programming platform that layers onto typical Computer-Aided Drawing (CAD) software and is used for design optimization in various fields, which can be a gateway to other forms of coding.

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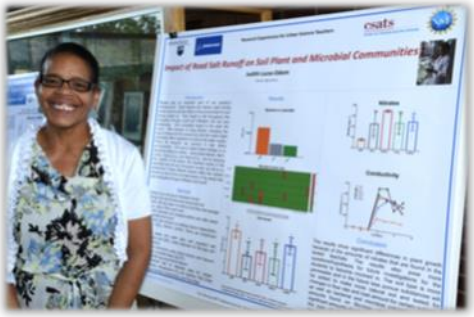
Research Experience for Teachers @ Home

June 15 - July 31, 2020

Our Cancer and Genetics Research Experience Teacher (RET) programs have moved online for the Summer of 2020!



During this 7-week full-time, **at home research experience, teachers will work virtually** with a faculty member on an authentic research project. All meetings will occur virtually and teachers will receive professional development provide by Center for Science and the Schools (CSATS) to help translate the experience to the classroom. **Applications will be reviewed May 4, 2020.**

Research Experience Topics:

Cancer Research

Placements for Health Science and Statistics teachers

- **Statistical analysis**
- **Epidemiology**
- **Prevention of infectious disease**
- **Public health**

Genetics Research

Placement for Biology teachers

- **Bioinformatics**

Check out projects on the next page!

Program Benefits

- $5000 stipend for the summer program and developing a classroom research project
- $1500 stipend for implementing the classroom research project with students during the academic year
- Opportunity to earn up to 3 graduate credits through Penn State (SCIED 597)
- Receive up to $1000 stipend for materials and resources needed to implement the classroom research project
- Option to present at MJ Murdock Partners in Science Conference in San Diego, CA, January 2021

Program Eligibility

→ Teach secondary biology, health science, statistics, or another discipline related to the research with at least 3 years full time teaching experience

→ Commit to implementing a classroom research project during the 2020-2021 academic school year

For further information, how to apply, and contact information please visit our website: csats.psu.edu

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Research Experience for Teachers @ Home

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Cancer Research Projects

Statistical analysis cancer research

In 2019, OCHE conducted the Cancer Community Health Assessment survey to determine prevalence of cancer-related behaviors, practices, care, and research in central Pennsylvania. The project objective is to learn and apply statistical analysis to survey data and develop communication tools for dissemination. The participant will use a statistical package, such as SAS, and prepare figures, charts, maps, and tables to compare survey results to epidemiological data of cancer incidence, morbidity, and mortality.

Cancer risk from preventable infectious disease

The objective of this project is learn and apply principles, resources and strategies to be used in the instruction of high school students in epidemiology and prevention of infectious disease-associated cancers in central PA, such as HPV and Hepatitis B. This project will lead to development of a school-based approach to examine epidemiologic and medical concepts such as cancer risk from infectious agents, research ethics, and clinical and public health trials to test prevention of these cancers. The project will also involve review of vaccination myths and strategies.

Epidemiology focused cancer research

The objective of this project is to learn and apply epidemiologic and statistical practices to estimate the impact of COVID-19 on cancer risk, incidence and mortality in central Pennsylvania. Clinical care has changed; in particular preventive care, such as cancer screening, has been delayed, as well as care for select cancer patients to reduce risk through immunosuppression and risk for COVID-19 contraction. This project will develop quantitative models to estimate the impact of these changes on cancer incidence, morbidity, and mortality in central Pennsylvania.

Clinic and public health human cancer research

The objective of this project is to learn and apply principles, resources and strategies for the instruction of high school students in the process of clinical and public health cancer research that involves human participants in central Pennsylvania. Concepts will include the process of scientific inquiry into cancer risk and treatment, study design, data analysis, recruitment and protection of human subjects, and diffusion/adoption of evidence from human cancer research. The project will focus on the unique populations for human cancer research in central Pennsylvania.

Genetics Research

Bioinformatics

This project will focus on gene regulation and transcription factor binding to introduce concepts in bioinformatics. Participants will learn how to computationally process DNA sequencing data, map regulatory events, and analyze their features to investigate whether regulatory elements have moved around the bat genome to help the species adapt liver metabolism to new diets.

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