

SURES
Summer Undergraduate Research in Energy Studies
Application and Program Information
Application Deadline: February 29, 2008

Background

CWRU is a multi-disciplinary research intensive university with key faculty participating in leading energy related research programs. Energy has been targeted as one of the key strategic and academic thrusts of our university to include the recent establishment of the Great Lakes Advanced Energy Institute. SURES is an educational and professional development program exposing students to cutting-edge research in energy related topics and introducing them to industrial partners engaged in energy related issues of concern for regional and global industries. The SURES program engages students, staff, faculty, and community members in discussion and debate of energy issues, as well as provide students exposure to technological and policy driven solutions. Students participating in this program are better prepared to enter industry and make a material impact early in their careers.

Acknowledgement

The SOURCE office and the SURES program directors recognize and are grateful to the Case Alumni Association (CAA) for their support of the SURES program. CAA has provided \$17,500 for SURES summer stipends for students in CSE, math, or the natural sciences.

Goals and Objectives

The Summer Undergraduate Research in Energy Studies (SURES) will expose students to basic concepts in energy research, as related to their discipline. Additionally students will learn about the broad area of energy research and attendant societal issues. Finally, students will be exposed to topics central to their professional development as future scientists, social scientists, and engineers. In summary the overall objectives of the program are:

- Expose students to fundamental concepts in energy such as renewable energy sources, energy, policy, and economics.
- Involve students in the research process
- Educate students in the broad area of energy research
- Train students in topics important to their professional development, including:
 - Laboratory Safety and Handling
 - Record keeping and intellectual property
 - Oral and Written Skills
 - Economic Policy Development
 - Team Building
 - Ethics

Eligibility

All undergraduate students at Case Western Reserve University who are continuing as undergraduates at Case in Fall 2008 are eligible to apply to the SURES program. Award recipients must be registered for fall classes prior to beginning the summer project. Projects must be completed at Case, and/or be under the supervision of a Case faculty member. Students who are awarded full research stipends (\$3,500)

cannot enroll in more than 4 hours of summer course work. While students may apply for funding for different projects, students may not accept funding for 2 different projects (that is, students may not be part of both the the SPUR and SURES programs). If you are accepted into more than one project program, you must choose in which project you want to participate.

The SURES Program

The 2008 Summer Undergraduate Research in Energy Studies (SURES) program is a ten week program beginning May 27 and continues through August 1, 2008. Each SURES participant will be paid a \$3,500 stipend. During the ten week program, students will work closely with their research mentors on their proposed projects. In addition, participants are required to participate in the weekly seminar series.

Sample Research Areas

As many CWRU students know, there are many faculty in many departments engage in energy related research. These are only two examples:

Computer Modeling of Proton-Conducting Membranes

Prof. Philip Taylor, Department of Physics

Undergraduates with some experience in computing have been very successful in my research program, which is aimed at elucidating the nature of proton transport in ionomer membranes by means of a combination of analytical theory and molecular modeling. There are two broad thrusts. The first of these is directed towards understanding the equilibrium structure of Nafion, which is a typical membrane material. The second thrust is concerned with the transport of protons through a membrane of this type. The research on structure will proceed by building on existing work, but with the introduction of some novel techniques, among which is a hybrid Molecular Dynamics--Monte Carlo approach. This method permits rapid computations by temporarily decoupling the motion of the hydrophilic polar side chains from that of the hydrophobic backbone. The work on transport of protons in Nafion-like membranes will also involve a combination of theory and simulation. Atomistic molecular-dynamics simulations will be employed to determine some of the characteristic parameters for the diffusion of protons in hydrated membranes. These results will be used in a theoretical model of non-linear diffusion to predict transport coefficients.

The goal of the research will be the development of new theoretical tools whereby the use of atomistic simulations that are run for modest lengths of time can lead to realistic and useful predictions. The search for new and more effective membranes for efficient fuel cells may receive some useful assistance from the development of these new theoretical tools.

Energy Efficiency and Conservation Studies

David Schwam, Materials Science and Engineering

Metal Casting is one of the most energy intensive industries. Large amounts of heat are required for melting, transferring and holding metal. The efficiency of these processes has a direct impact on the profitability of the operation. In addition, metal casters use compressors, motors, fans, lighting and other auxiliary equipment that consumes energy. The Case Metal Processing Laboratory is conducting industrial energy studies with undergraduate and graduate students' participation. Projects include benchmarking of energy use in electrical and gas equipment, evaluation of new technologies, design and implementation of engineering modifications to improve energy efficiency. The projects include off site visits of industrial operations.

Weekly Seminar Series

The weekly seminar series will be divided into two components (1) SURES weekly Thursday seminar (a) featuring industry and faculty guest speakers and (b) student presentations about their work ; (2) SOURCE Tuesday Lunch & Learn Seminars (general education seminars). SURES participants are

required to attend all of the SURES weekly seminars. SURES participants are required to attend 4 of 8 of the SOURCE Tuesday Lunch & Learn Series.

1a) Faculty and Industry Speakers

Previous summers' speaker series was a great success attracting faculty and graduate students as well as undergraduate students. Past schedules are included in the appendix. This year's schedule will be at least as inviting.

1b) Student Presentations

Students will be expected to present about their research projects and their most recent results. The purpose of these presentations is three-fold: to teach the students ways to organize the results and present it to their peers in a concise manner, to expose students to different areas of energy research, and to improve their presentation and communication skills.

2) SOURCE Tuesday Lunch & Learn Seminars

Finally, the SOURCE office provides general educational seminars to all summer research students throughout the summer. Topics include:

- Utilizing Research Databases
- Ethics and research
- Graduate School Application Process
- How to Develop and Present a Poster

Application Procedure

A completed application file consists of the following:

- 1) The SURES summer funding application form
- 2) An official academic transcript
- 2) A brief (approximately 3 pages) proposal that addresses the following:
Project Title, Goals and Objectives, Project Description (including information about methodology), Discussion of time commitment required for the project, Discussion of how this project is part of the student's overall educational plan and goals, Discussion of how this project meets the goals and objectives of the SURES program, Budget Justification – If the student is requesting materials support, please include a detailed description and costs of materials needed.
- 4) A resume (this is required...your application will not be considered without it.)
- 5) The Faculty Sponsor Form (also available online).

Students may also want to review the funding hints on the SOURCE website:

<http://www.case.edu/provost/source/opp/oncampus.htm>

Deadline and Notification

The deadline for submitting a completed Application File, which includes application form, proposal, and faculty support form, is Friday, February 29, 2008. It is our goal to select and notify students for this program in early April. Please send the application to the SOURCE Office, Sears 451. Or email to: sheila.pedigo@case.edu or bethany.pope@case.edu.

Please do not hesitate to contact either of the SURES program directors if you have questions.

Sheila Pedigo
SOURCE Director
sheila.pedigo@case.edu
216.368-8508

Linda Robson
Finance & Administration Fellow for Energy Studies
Linda.robson@case.edu
216.368.5328

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I. Identification Information

Student Name:

Last	First	MI
Email Address	Phone	Expected Graduation
Academic Major 1	Academic Major 2/Academic Minor	
Cumulative GPA _____		

II. Project Information

Project Title:

Faculty Sponsor	Phone	Email	Sponsoring Dept.
Project Begin Date: ____/____/____	Project Expected End Date: ____/____/____		
Expected number of hours per week to be spent on project? _____			

Budget Information

Award amounts are up to \$3500.00 for full time or less than \$3500 for part time commitment to proposed project.

Total Amount Requested _____

Total amount requested from other sources including faculty sponsor support _____

List all other summer funding sources and or project programs for which you have applied (e.g. SPUR; SOURCE Summer Funding, Experiential Learning Fellowship in the Arts, Humanities, and Social Sciences; etc.).

III. Project Commitment

Signature below (or emailing information) documents agreement to commitment.

Student Commitment

- To participate in the proposed project
- To participate in the SOURCE Undergraduate Symposium & Poster Session, Spring 2009.
- To attend and participate in the weekly SURES meetings, including student presentations and guest speakers
- To attend at least 4 of the SOURCE Tuesday Lunch & Learn Seminars
- To prepare final written report
- To prepare project evaluation

Faculty Commitment

- To supervise and direct the student's work.
- To prepare project evaluation.

Student Signature	Date
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Faculty Signature	Date
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Faculty Sponsor Form

Student Applicant: Please complete the top part of this form and forward the form to your faculty sponsor.

Applicant's Name & Email Address _____

Faculty Sponsor's Name & Email _____

Department _____

Check one: I waive my right to inspect this form.

I do not waive my right to inspect this form.

Applicant's Signature _____ Date _____

1) How long and in what capacity have you known the applicant?

2) Please describe why this proposal deserves to be funded. You may attach an additional page if necessary.

3) Is the applicant's proposal related to your own research? Yes No

If yes, how much do you plan to financially contribute to this applicant's work and how will this financial support be utilized? Please note if you cannot financially contribute toward this student's work.

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Faculty Sponsor Form, p.2

4) Please complete the following:	Strongly Disagree				Strongly Agree
The applicant is capable of executing this proposal.	1	2	3	4	5
The proposed budget for this project is justified.	1	2	3	4	5
Execution of this proposal will broaden the applicant's experience.	1	2	3	4	5
Execution of this proposal will contribute to the applicant's education.	1	2	3	4	5
Execution of this proposal will contribute to the applicant's future plans.	1	2	3	4	5

5) Please add any other comments in support of this applicant's proposal.

Please email completed form to sheila.pedigo@case.edu or bethany.pope@case.edu or through campus mail to SOURCE, Sears 451 or LC 7212 no later than Friday, February 29, 2008.