RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 46

LAST NAME     FIRST NAME     ACADEMIC TITLE
Bass           Brad          Dr.

DEPARTMENT     OFFICE PHONE  416-978-6285
Centre for Environment

OFFICE FAX     416-978-3884

CAMPUS ADDRESS Room 3039, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS brad.bass@ec.gc.ca

TITLE OF RESEARCH PROJECT
Ecological Technology - I

OBJECTIVES AND METHODOLOGY

The objective is to assess the degree to which ecologically-based technologies, such as green roofs or green walls, can reduce energy consumption in the summer and winter. The assessment is done on the computer with the Environmental Systems Performance-research (ESP-r) model, which simulates how much energy is consumed by a particular building.

NUMBER OF STUDENT PLACES AVAILABLE 1

DESCRIPTION OF STUDENT PARTICIPATION

The student will run simulations with ESP-r. This will involve:

- Learning Linux and ESP-r using a tutorial and test buildings
- Constructing buildings on the computer
- Adding a green roof or other technologies to the building
- Performing the simulation

The student will also have the opportunity to interact with other personnel involved in this research. Typically, an applicant for this project will be majoring in Physics, Engineering, Math, Architecture or Computer Science. However, all interested students are encouraged to apply. There are no formal prerequisites, but one or more of the following - first year physics or chemistry, knowledge of Linux, knowledge of building systems, knowledge of FORTRAN and/or an ability to visualize buildings from blue prints - are all assets for this ROP.

CHAIR'S/UNDERGRADUATE DATE Jan 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 47

LAST NAME FIRST NAME ACADEMIC TITLE
Bass Brad Dr.

DEPARTMENT OFFICE PHONE 416-978-6285
Centre for Environment OFFICE FAX 416-978-3884

CAMPUS ADDRESS Room 3039, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS brad.bass@ec.gc.ca

TITLE OF RESEARCH PROJECT
Ecological Technology - II

OBJECTIVES AND METHODOLOGY

The objective is to explore how ecologically-based technologies, such as green roofs, green walls and living machines can be used by municipalities to adapt to climate change

NUMBER OF STUDENT PLACES AVAILABLE 1

DESCRIPTION OF STUDENT PARTICIPATION

The student will assist with the maintenance of a living machine and/or assist with research on other ecological technologies. The student will also assist with other researchers with conducting experiments with the living machine, literature reviews, analysis of surveys and/or changes to the design of the living machine or another ecological technology. There are no formal prerequisites, but first year engineering, biology and/or chemistry, experience with small construction projects and/or small machine repairs, measuring water quality and/or some experience in working with plants/aquatic animals would be an asset. A student with sufficient experience may also be given the opportunity to design and build a variation of the living machine or another ecological technology of interest.

CHAIR’S/UNDERGRADUATE DATE Jan 12/06
CHAIR’S SIGNATURE
Project Number 48

LAST NAME  FIRST NAME  ACADEMIC TITLE
Bass        Brad          Dr.

DEPARTMENT  OFFICE PHONE  416-978-6285
Centre for Environment  OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Room 3039, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS  brad.bass@ec.gc.ca

TITLE OF RESEARCH PROJECT
Simulating Adaptation in a Changing Environment - I

OBJECTIVES AND METHODOLOGY
The objective is to explore how systems, composed of individuals, adapt to environmental change and to explore the role of chaos and complexity in adaptation. Experiments are run with COBWEB (Complexity and Organized Behaviour within Environmental Bounds - a software package, developed by Environment Canada).

NUMBER OF STUDENT PLACES AVAILABLE  3

DESCRIPTION OF STUDENT PARTICIPATION
The students will use the COBWEB to explore the patterns of population growth, resource consumption, energy consumption, communication and cooperation that emerge under a wide range of environmental conditions. The students do not require knowledge of any programming language, but knowledge of EXCEL and/or graphing packages, predator-prey interactions, population growth, spatial organization and/or evolutionary economics, and a willingness to take statistics in second year would be an asset. The students can run experiments on their own computers running Windows XP, Windows 2000, Linux or MAC OS10.4 or use our computers. Students who produce high quality work will have the opportunity to co-author a peer-reviewed publication. Students will also have the opportunity to work with and mentor a high school student. This ROP offers significant opportunities for innovation, self-directed learning, experimentation and leadership but requires an ability to work independently, as well as to work as part of a team.

CHAIR’S/UNDERGRADUATE       DATE  Jan. 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 49

LAST NAME  FIRST NAME  ACADEMIC TITLE
Bass        Brad        Dr.

DEPARTMENT  OFFICE PHONE  416-978-6285
Centre for Environment  OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Room 3039, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS  brad.bass@ec.gc.ca

TITLE OF RESEARCH PROJECT
Simulating Adaptation in a Changing Environment - II

OBJECTIVES AND METHODOLOGY
The objective is to explore how systems adapt to environmental change and to explore the role of chaos and complexity in adaptation. Experiments are run with COBWEB (Complexity and Organized Behaviour within Environmental Bounds - a software package, developed by Environment Canada).

NUMBER OF STUDENT PLACES AVAILABLE 3

DESCRIPTION OF STUDENT PARTICIPATION
The students will modify the COBWEB software program according to the needs of the project. The software uses artificial intelligence tools that stimulate how autonomous agents learn in a changing environment. Examples of projects might include modifications to the environment, the addition of spatial statistics and modifications for specific applications. If the students demonstrate sufficient initiative and knowledge, other programming opportunities will be made available involving the programming of different artificial intelligence algorithms. Students may be offered the opportunity to mentor a high school student. The students must be proficient in the Java language, or must demonstrate the capability to learn Java (proficient in C++) during the summer. This ROP offers significant opportunities for innovation, software development, self-directed learning and leadership but requires an ability to work independently, as well as work as part of a team.

CHAIR'S/UNDERGRADUATE DATE  Jan. 12/06
CHAIR'S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 50

SUMMER PROJECT ONLY

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth      Dr.

DEPARTMENT  OFFICE PHONE  416-978-8202
Centre for Environment

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Energy Efficiency Analyst

OBJECTIVES AND METHODOLOGY

The objective of this project is to assess the potential for energy conservation with respect to elevator usage on campus, as part of the larger effort of the Sustainability Office to meet Kyoto targets. Indirect measurements and calculations may be made during the analysis to estimate potential and actual effect.

NUMBER OF STUDENT PLACES AVAILABLE 1

DESCRIPTION OF STUDENT PARTICIPATION

The student will be responsible for an inventory of elevators on campus and their use. They will work with staff in the Utilities division to research the potential for conservation using demand management and will explore the possibility of selective shutdowns on a temporary or permanent basis as well as other methods through which elevator use may be reduced. They will then write a report on their findings with recommendations for steps forward.

CHAIR’S/UNDERGRADUATE DATE Jan 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 51
SUMMER PROJECT ONLY

LAST NAME      FIRST NAME    ACADEMIC TITLE
Savan          Beth           Dr.

DEPARTMENT  OFFICE PHONE  416-978-8202
Centre for Environment  OFFICE FAX   416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Rewire Toolkit Expansion Project

OBJECTIVES AND METHODOLOGY
The Rewire Project builds on well-known principles of social marketing, and applies them to environmental behaviours to discover factors such as perceived social norms and physical infrastructure, which inhibit individuals from making sustainable choices. The project takes a multifaceted approach to community based social marketing in order to identify the key strategies necessary to creating a culture of sustainability. The end goal is to achieve long-term behaviour change and internalization of sustainable attitudes and behaviours, which will be rigorously measured and analyzed using a survey and energy use data.

NUMBER OF STUDENT PLACES AVAILABLE     1

DESCRIPTION OF STUDENT PARTICIPATION
Rewire will evaluate and make recommendations and begin to plan the application of the Rewire project across the St. George Campus. The student will take into account logistical, administrative and governance issues, develop a work plan for the project and build a preliminary implementation package.

CHAIR’S/UNDERGRADUATE DATE Jan 12/06
CHAIR’S SIGNATURE
SUMMER PROJECT ONLY

PROJECT DESCRIPTION

Project Number 52

Savan
Beth
Dr.

Centre for Environment

Suite 1016, Earth Sciences Centre, 33 Willcocks Street

b.savan@utoronto.ca

Rewire Project

OBJECTIVES AND METHODOLOGY

The Rewire Project builds on well-known principles of social marketing, and applies them to environmental behaviours to discover factors such as perceived social norms and physical infrastructure, which inhibit individuals from making sustainable choices. The project takes a multi-faceted approach to community based social marketing in order to identify the key strategies necessary to creating a culture of sustainability. The end goal is to achieve long-term behaviour change and internalization of sustainable attitudes and behaviours, which will be rigorously measured and analyzed using a survey and energy use data.

NUMBER OF STUDENT PLACES AVAILABLE 2

DESCRIPTION OF STUDENT PARTICIPATION

Students will be responsible for compiling and analyzing data from energy meters before, during, and after the campaign to reduce electricity use. This analysis will be presented in report format with recommendations concerning the findings of the Rewire project and their implications for improvement.

CHAIR’S/UNDERGRADUATE DATE Jan 12/06
CHAIR’S SIGNATURE
# Project Number 53

## SUMMER PROJECT ONLY

<table>
<thead>
<tr>
<th>LAST NAME</th>
<th>FIRST NAME</th>
<th>ACADEMIC TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savan</td>
<td>Beth</td>
<td>Dr.</td>
</tr>
</tbody>
</table>

### DEPARTMENT
Centre for Environment

### OFFICE PHONE
416-978-8202

### OFFICE FAX
416-978-3884

### CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

### E-MAIL ADDRESS
b.savan@utoronto.ca

### TITLE OF RESEARCH PROJECT
**Greenhouse Gas Inventory Analysis**

### OBJECTIVES AND METHODOLOGY

The goal of this project is to assess U of T greenhouse gas emissions on a building by building basis, and determine areas of improvement that could lead to a reduction in greenhouse gas intensity. Database manipulation and analysis will be involved.

### NUMBER OF STUDENT PLACES AVAILABLE
1

### DESCRIPTION OF STUDENT PARTICIPATION

The student will aid in the development and analysis of a greenhouse gas inventory for the University of Toronto St. George Campus. Research in this area is cutting edge, and has wide-ranging implications for international agreements such as the Kyoto Protocol. The role of the student will include data collection, organization, analysis and presentation of results.

### CHAIR’S/UNDERGRADUATE

### DATE
Jan 12/06

### CHAIR’S SIGNATURE
Project Number 54

SUMMER PROJECT ONLY

LAST NAME    FIRST NAME    ACADEMIC TITLE
Savan         Beth          Dr.

DEPARTMENT          OFFICE PHONE  416-978-8202
Centre for Environment    OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Environmental Policy Analyst

OBJECTIVES AND METHODOLOGY

The Sustainability Office will be undertaking a review of University of Toronto policies concerning energy and resource consumption, with the goal of increasing efficiency and fostering a culture of sustainability at the University of Toronto.

NUMBER OF STUDENT PLACES AVAILABLE  1

DESCRIPTION OF STUDENT PARTICIPATION

The student will be responsible for assisting University staff in the detailed review of University policies that have an impact on energy consumption. This project will include researching, compiling and analyzing relevant University policies and recommending changes as informed by best practices elsewhere.

CHAIR’S/UNDERGRADUATE DATE  Jan 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 55

SUMMER PROJECT ONLY

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth        Dr.

DEPARTMENT  OFFICE PHONE  OFFICE FAX
Centre for Environment  416-978-8202  416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Bikechain Transportation Analyst

OBJECTIVES AND METHODOLOGY
The Bikechain project aims to reduce reliance on motor vehicles by offering a hands-on educational experience to all those who are interested in bicycle repair and maintenance. The Bikechain hopes to empower cyclists and to create a physical and conceptual space to serve the bicycling culture on campus. Besides improvements in air quality, this initiative will also foster a sense of community cohesion amongst cyclists on campus, and will improve the affordability and safety of cycle commuting. The Bikechain is looking for effective methods that it can employ to encourage greater bicycle use on and off campus. Research may involve survey, monitoring, and database analysis.

NUMBER OF STUDENT PLACES AVAILABLE 2

DESCRIPTION OF STUDENT PARTICIPATION
The students will evaluate transportation demand and modal choice on campus. They will then evaluate potential for various measures to produce a shift away from using automobiles and the impact of Bikechain on this transformation. The students will then write a report presenting the findings along with recommendations on how to proceed most effectively.

CHAIR’S/UNDERGRADUATE DATE  Jan 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 56

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth      Dr.

DEPARTMENT  OFFICE PHONE  416-978-8202
Centre for Environment  OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Energy Efficiency Analyst

OBJECTIVES AND METHODOLOGY
The objective of this project is to assess the potential for energy conservation with respect to elevator usage on campus, as part of the larger effort of the Sustainability Office to meet Kyoto targets. Indirect measurements and calculations may be made during the analysis to estimate potential and actual effect.

NUMBER OF STUDENT PLACES AVAILABLE  1

DESCRIPTION OF STUDENT PARTICIPATION
The student will be responsible for an inventory of elevators on campus and their use. They will work with staff in the Utilities division to research the potential for conservation using demand management and will explore the possibility of selective shutdowns on a temporary or permanent basis as well as other methods through which elevator use may be reduced. They will then write a report on their findings with recommendations for steps forward.

CHAIR'S/UNDERGRADUATE  DATE  Jan 12/06
CHAIR'S SIGNATURE
Project Number 57

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth      Dr.

DEPARTMENT  OFFICE PHONE  416-978-8202
Centre for Environment  OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Rewire Toolkit Expansion Project

OBJECTIVES AND METHODOLOGY

The Rewire Project builds on well-known principles of social marketing, and applies them to environmental behaviours to discover factors such as perceived social norms and physical infrastructure, which inhibit individuals from making sustainable choices. The project takes a multifaceted approach to community based social marketing in order to identify the key strategies necessary to creating a culture of sustainability. The end goal is to achieve long-term behaviour change and internalization of sustainable attitudes and behaviours, which will be rigorously measured and analyzed using a survey and energy use data.

NUMBER OF STUDENT PLACES AVAILABLE  1

DESCRIPTION OF STUDENT PARTICIPATION

Rewire will evaluate and make recommendations and begin to plan the application of the Rewire project across the St. George Campus. The student will take into account logistical, administrative and governance issues, develop a work plan for the project and build a preliminary implementation package.

CHAIR’S/UNDERGRADUATE  DATE  Jan 12/06
CHAIR’S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 58

LAST NAME      FIRST NAME      ACADEMIC TITLE
Savan          Beth           Dr.

DEPARTMENT          OFFICE PHONE           OFFICE FAX
Centre for Environment          416-978-8202          416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Rewire Project

OBJECTIVES AND METHODOLOGY

The Rewire Project builds on well-known principles of social marketing, and applies them to environmental behaviours to discover factors such as perceived social norms and physical infrastructure, which inhibit individuals from making sustainable choices. The project takes a multi-faceted approach to community based social marketing in order to identify the key strategies necessary to creating a culture of sustainability. The end goal is to achieve long-term behaviour change and internalization of sustainable attitudes and behaviours, which will be rigorously measured and analyzed using a survey and energy use data.

NUMBER OF STUDENT PLACES AVAILABLE         2

DESCRIPTION OF STUDENT PARTICIPATION

Students will be responsible for compiling and analyzing data from energy meters before, during, and after the campaign to reduce electricity use. This analysis will be presented in report format with recommendations concerning the findings of the Rewire project and their implications for improvement.

CHAIR’S/UNDERGRADUATE          DATE  Jan 12/06
CHAIR’S SIGNATURE
Project Number 59

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth      Dr.

DEPARTMENT             OFFICE PHONE  416-978-8202
Centre for Environment  OFFICE FAX    416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Greenhouse Gas Inventory Analysis

OBJECTIVES AND METHODOLOGY
The goal of this project is to assess U of T greenhouse gas emissions on a building by building basis, and determine areas of improvement that could lead to a reduction in greenhouse gas intensity. Database manipulation and analysis will be involved.

NUMBER OF STUDENT PLACES AVAILABLE   1

DESCRIPTION OF STUDENT PARTICIPATION
The student will aid in the development and analysis of a greenhouse gas inventory for the University of Toronto St. George Campus. Research in this area is cutting edge, and has wide-ranging implications for international agreements such as the Kyoto Protocol. The role of the student will include data collection, organization, analysis and presentation of results.

CHAIR'S/UNDERGRADUATE       DATE  Jan 12/06
CHAIR'S SIGNATURE
Project Number 60

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth       Dr.

DEPARTMENT    OFFICE PHONE  416-978-8202
Centre for Environment  OFFICE FAX  416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Environmental Policy Analyst

OBJECTIVES AND METHODOLOGY
The Sustainability Office will be undertaking a review of University of Toronto policies concerning energy and resource consumption, with the goal of increasing efficiency and fostering a culture of sustainability at the University of Toronto.

NUMBER OF STUDENT PLACES AVAILABLE 1

DESCRIPTION OF STUDENT PARTICIPATION
The student will be responsible for assisting University staff in the detailed review of University policies that have an impact on energy consumption. This project will include researching, compiling and analyzing relevant University policies and recommending changes as informed by best practices elsewhere.

CHAIR'S/UNDERGRADUATE      DATE  Jan 12/06
CHAIR'S SIGNATURE
RESEARCH OPPORTUNITY PROGRAM
299Y PROJECT DESCRIPTION
2006 - 2007

Project Number 61

LAST NAME  FIRST NAME  ACADEMIC TITLE
Savan      Beth       Dr.

DEPARTMENT  OFFICE PHONE   416-978-8202
Centre for Environment  OFFICE FAX   416-978-3884

CAMPUS ADDRESS
Suite 1016, Earth Sciences Centre, 33 Willcocks Street

E-MAIL ADDRESS
b.savan@utoronto.ca

TITLE OF RESEARCH PROJECT
Bikechain Transportation Analyst

OBJECTIVES AND METHODOLOGY
The Bikechain project aims to reduce reliance on motor vehicles by offering a hands-on educational experience to all those who are interested in bicycle repair and maintenance. The Bikechain hopes to empower cyclists and to create a physical and conceptual space to serve the bicycling culture on campus. Besides improvements in air quality, this initiative will also foster a sense of community cohesion amongst cyclists on campus, and will improve the affordability and safety of cycle commuting. The Bikechain is looking for effective methods that it can employ to encourage greater bicycle use on and off campus. Research may involve survey, monitoring, and database analysis.

NUMBER OF STUDENT PLACES AVAILABLE 2

DESCRIPTION OF STUDENT PARTICIPATION
The students will evaluate transportation demand and modal choice on campus. They will then evaluate potential for various measures to produce a shift away from using automobiles and the impact of Bikechain on this transformation. The students will then write a report presenting the findings along with recommendations on how to proceed most effectively.

CHAIR’S/UNDERGRADUATE DATE  Jan 12/06
CHAIR’S SIGNATURE