Undergraduate Research Program (URP) in Chemical Engineering

The Role of Graduate Education and Research in Undergraduate Education

Research, a component usually forgotten or misunderstood in undergraduate engineering education, is not a luxury in a department of chemical engineering. The relationship between teaching and research is symbiotic. High quality research generates ideas, which evolve into theories, which find their way into textbooks, which are read by students, who may be taught by the faculty member who originally set the whole process in motion. It is this exchange of ideas that yields new, thought-provoking textbooks, and also generates productive new research programs.

It is important that the undergraduate student in engineering realize the significant role in the undergraduate curricula played by graduate school and research activities. It is easy to jump to the conclusion that time spent by faculty on research and graduate education could be more profitably put to use in the classroom. However, outstanding educators and shapers of the modern chemical engineering profession have strongly suggested that research and graduate education is crucial for the health of the undergraduate curriculum.

Dr. Robert Bird (University of Wisconsin-Madison), an eminent educator, winner of the National Medal of Science, and mentor of several generations of chemical engineering faculty, has stated that "now as always, the quality of teaching depends on ideas generated by research". According to Bird, research and graduate studies work as "natural filters" in which new knowledge is communicated in advanced courses, and gradually finds its way into the undergraduate curriculum. For example, many well established results presently taught in the transport properties courses have been the focus of high level research topics in the past. Similarly, new concepts in biotechnology and advanced materials are being filtered toward eventual incorporation into undergraduate material.

It is clear that, from this point of view, chemical engineering undergraduate programs will become weak, less healthy, and less useful for our profession without partnerships with solid and outstanding research programs. Perhaps less obvious is the fact that research and graduate studies also generate engineering teaching faculty and leading researchers of the future. Neither industry nor undergraduate programs produce professors of chemical engineering. Only the graduate level university has the capability, means, and environment to produce MS and Ph.D. graduates. These become the men and women that will be able to educate more bachelors degree candidates.

It is not a coincidence that leading engineering schools have strong research programs that parallel their undergraduate teaching programs. The ties between teaching and research are more than symbolic. Research and graduate education are crucial parts of every undergraduate chemical engineering program. R. Bird described the relationship in the following words: "To do a good job of teaching, a professor must be a good communicator. Further, what is communicated must be relevant to students' needs. In engineering, which changes rapidly with each new technological advance, it is imperative that professors have the resources to absorb and communicate new knowledge. Research provides the mechanism that allows a professor to constantly upgrade the breadth and depth of his knowledge. Not the least of the benefits of research is the vitality which the investigative process imparts to the instructional program".

Program Overview

Numerous research opportunities for undergraduates to work closely with faculty and graduate students are available and are encouraged in the Department of Chemical and Biomedical Engineering. The Department offers an Undergraduate Research Program (URP) for academically talented students to extend their undergraduate educational experiences. The program requires independent research by the student on a topic relevant to chemical engineering (including biomedical engineering). Completion of an Undergraduate Research Project (URP) for six hours of credit with a grade of "C" or higher may be used to satisfy the Chemical Engineering senior elective requirement.

Students can sign up for this program either as ECH 4906 (Honors URP) or ECH 4904 (URP). ECH 4906 is reserved for students who qualify for the University Honors in the Major program. Students may apply the work done for the URP toward the Honors Program requirements, where applicable. Students interested in the Honors in the Major option should directly contact the Honors Program Office for specific requirements. Generally, application to the Honors in the Major Program must be initiated during the term prior to registering for the course. Students who do not qualify for the University Honors program, but still meet the admission requirements given below, may enroll in ECH 4904.

The undergraduate research project will require at least two semesters of effort, and the URP must be started at the latest by the first semester of the senior year. However, students are highly encouraged to start in the final semester of their junior year, or in the Summer Term preceding their senior year. Applications for entry into the program are to be submitted at least six weeks before the end of the semester prior to that in which the research program is to start.

Admission Requirements

1. Must have completed or be currently enrolled in ECH 3274L (Measurements/Transport Phenomena Lab) and ECH 4267 (Advanced Transport Phenomena).
2. Must have a minimum of 3.0 or higher University Cumulative and Chemical Engineering GPAs.
3. Must have a minimum of 3.0 or higher Cumulative GPA on all transfer credit.

Application Procedure

Students who satisfy the admission requirements can make formal application to the URP. The "Application Form" (Form 1) requires a brief description of the proposed project and the student's motivation for pursuing the URP.

Selection of Directing Professor

A presentation on the research opportunities available through the URP will be made by the URP director to the junior class of the Department during the Fall Term. In addition, a listing of faculty participating in the URP and a description of available projects can be found on the departmental web page at: https://eng.fsu.edu/cbe/undergraduate/undergraduate_research_prog.html. Students interested in the URP should meet with faculty members whose research is of interest to them to obtain additional details on specific projects. The URP application is to be submitted at least six weeks before the end of the semester prior to that in which the research program is to start.

The URP program director and the chair of the undergraduate committee will review the application form, and the student will be informed about the final assignment of directing professor and project in writing before the end of the semester in which the application is submitted. A copy of this notice will also be sent to the faculty advisor and the department chair. Admission to the URP is contingent upon availability of research projects and faculty advisors. Faculty of the Chemical and Biomedical Engineering Department may advise up to two URP students per semester. Exceptions to this number shall be requested to and approved by the department chair.

Upon admittance, the advisor requests a course section to be opened for the particular project. A folder will be opened for the student in which all relevant documentation will be maintained.

Project Requirements

Research Plan

A three to four page "Research Plan" (Form 2) must be submitted to the URP director by the end of the fourth week of the first term of the URP. This must be signed by the directing professor (see attached sample).

Supervisory Committee

The student should form a supervisory committee consisting of the directing professor and at least two additional faculty members, one of whom may be external to the department. A completed "Establishment of Supervisory Committee Form" (Form 3) with the faculty signatures must be submitted to the URP director along with the Research Plan.

Interim Progress Report

An interim progress report must be submitted to the supervisory committee before the last day of classes of the semester. This report should be about five to ten pages in length, and must provide a summary of the work done in the semester along with preliminary results and a research plan for the next semester. The directing professor will then assign the semester grade and submit the "Completion of First Term Form" (Form 4) to the URP director.

Students who are not recommended for continuation in the URP or choose not to continue may apply any credits received in the URP with a grade of “C” or better towards the Chemical Engineering elective requirements.

Final Project Report and Defense

In the final semester of the Undergraduate Research Project, a final project report must be submitted to the supervisory committee. This report should be about fifteen to twenty pages in length (at least thirty pages for Honors in the Major) and should present the final results and conclusions of the research. This report must be orally defended before the supervisory committee. Students are advised to submit the written reports to their committees well before the date of the defense, in case changes are needed before the oral presentation.

The student must inform the URP director in writing of the date, time, and place of the final project defense at least two weeks in advance of the proposed defense date. Also, a copy of the final project report must be submitted after successful completion of the defense.

Final Project Report Format

Staple and book tape binding is recommended. The title page must show the original signatures of all committee members, with typed names beneath each signature. After the defense has taken place, the directing professor will submit the "Completion of Final Term Form" (Form 5) with the committee's recommendation for approval or denial and the final grade to the URP director.

Credits and Rewards

Upon successful completion of the Undergraduate Research Program, all six credit hours may be applied toward the Chemical Engineering elective requirements for the Bachelor's degree in Chemical Engineering. Additionally, upon completion of the program, the student will receive:

- Recognition on the permanent record in the student's folder in the Department of Chemical and Biomedical Engineering.

Undergraduate Research Topics are available on topics such as:

Tissue Engineering
Magnetic Resonance Imaging
Non-Thermal Plasma Processes for Air and Water Pollution Treatment.
Peptide self-assembly
Growth and Characterization of semiconductors
Colloidal systems
Semicrystalline Polymers
Batteries
Biomass
Nanoengineering

URP Forms and Guidelines

Form 1 -- Application Form
URP Guidelines for Advisor and Student
Form 2 -- Research Plan (Prospectus)
Form 3 -- Establishment of Supervisory Committee Form
Form 4 -- Completion of First Term Form
Form 5 -- Completion of Final Term Form

FORM 1 -- APPLICATION FORM
(Must be submitted to the URP Director by the end of the term prior to beginning the URP.)

Undergraduate Research Project (URP)
Department of Chemical and Biomedical Engineering
FAMU-FSU College of Engineering

Name________________________________ ________________________________

Address____

Phone______________________________ E-mail____________________________

Date of Application__________________ University (FAMU or FSU)____________

Class (Junior or Senior)_______________ Credit Hours Completed______________

University GPA_______________________ Departmental GPA__________________

Proposed URP Faculty Advisor____

Proposed URP Topic____

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Proposed Academic Terms of URP (e.g., Fall 2013 & Spring 2014)____________________

Approval Signatures With Dates

________________________________ ________________________________
URP Student | URP Program Director

________________________________ ________________________________
URP Advisor | Undergraduate Committee Chair

* Student: Please attach a 1 - 3 page project description and your motivation for undertaking the Undergraduate Research Project.

<u>URP GUIDELINES FOR ADVISOR AND STUDENT</u>

(Optional; shown is an example of a contract between a faculty advisor and a student.)

Undergraduate Research Project (URP)

Department of Chemical and Biomedical Engineering

FAMU-FSU College of Engineering

(See example, below)

FAMU - FSU COLLEGE OF ENGINEERING

Department of Chemical Engineering

2525 Pottsdamer Street, Tallahassee, FL 32310-6046

Phone: (904) 487-6149 FAX: (904) 487-6150 che@engfsu.edu

MEMORANDUM

TO: Mr. Steven White (URP Student)

FROM: Dr. Bruce R. Locke (Faculty Advisor))

CC: Dr. Michael Peters (Department Chair) and Dr. Rufina G. Alamo (URP Director)

DATE: May 8, 2013

RE: URP Research for Fall 2013

Please find the attached guidelines for your DIS (Note: now URP) research project. We look forward to a productive project where you will learn much about research. You should expect to spend a minimum of ten hours per week on this project and we will strictly enforce the policy that completion of the first semester work is a prerequisite for continuing the project in the second semester. We expect that the work proposed will contribute significantly to our efforts in understanding the use of a pulsed corona discharge for nitrogen oxide treatment.

URP RESEARCH
ECH 4904
Department of Chemical Engineering
FAMU-FSU College of Engineering

Fall 2013

Student: Mr. Steven White

Course Subject: Nitrogen Oxide Removal Using Pulsed Corona Discharge

Tentative Project Title: Study of Carbon Electrodes for Enhanced Nitrogen Oxide Removal in Pulsed Corona Discharge Reactors.

Director: Dr. Bruce R. Locke

Requirements:

1. Preliminary Written and Oral Report (by the end of the Spring Semester) (40%-first semester)

2. Final Project Thesis and Oral Report (by the end of last Semester) (40%- last semester) Project Notebook (30%-both semesters)

3. Performance in Laboratory (30% - both semesters)

Description:

The objectives of this directed individual research class is to further develop the student's ability to perform chemical engineering research. Efforts in this project will include the planning, performance, and analysis of experiments to investigate the use of new electrode materials for the removal of nitrogen oxides by pulsed corona discharge.

A written proposal will be required by end of the second week of the spring semester, i.e., January 17, 1997. This report should summarize the plans for the research project and should include some of the preliminary work performed in the previous semester.

A written mid-project report detailing the student's experimental research must be submitted by the end of the first semester. This report should include descriptions of the background of the project, the hypothesis under study in the research, and an introduction to the theoretical analysis and results from the first semester study. A relatively complete list of references should be included. No page limit is required; however, this document should adequately address all of the above factors. This report will also be presented orally in an open meeting to the faculty committee. Continuation of DIS (URP) into the second semester will be based upon performance during the first semester.

The student is expected to be on time and prepared for each session with the professor. This will require preparation and planning before going to the meeting. A project laboratory notebook will be assigned. All entries should be neatly prepared. A final oral and written thesis will be due by the end of the last semester. This document should be a complete description of the work done, the results obtained, and recommendations for future work. Guidelines can be obtained from previous student reports (e.g., Ms. Sharon Sauer and Mr. Craig Galban).

FORM 2 -- RESEARCH PLAN (PROSPECTUS)
(Must be submitted to the URP director by the end of the fourth week of the first term of the URP.)

Undergraduate Research Project (URP)

Department of Chemical and Biomedical Engineering
FAMU-FSU College of Engineering

(See example next page)

Development of Experimental Keratin Models to Study the Physical Properties of the Hydrophilic Regions within the Stratum Corneum

PROSPECTUS

Honors in Chemical Engineering (ECH 4906)
Fall and Spring Semester 2012-13

Ms. Cherie L. Stabler

____
Honors Student (Signature)

Dr. Bruce R. Locke

____
Honors Directing Professor (Signature)

Development of Experimental Keratin Models to Study the

Physical Properties of the Hydrophilic Regions within the

Stratum Corneum

by

Cherie L. Stabler

The primary function of the skin is to serve as a barrier against external elements while keeping vital substances in the body. The physical nature of the skin, and more specifically the stratum corneum, is a highly structured and unique arrangement of proteins and lipids interrupted by shafts of hair follicles and sweat glands. The stratum corneum is the outer layer of the skin and is comprised of mainly dead cells. The dead cells (corneocytes) of this seemingly impermeable layer are surrounded by a specific arrangement of several lipids in multilamellar bilayers. The corneocytes within this lipid medium are protein structures that are composed mainly of keratin. Furthermore, the keratin proteins are cross-linked within the lipid mixture by another protein called fillaggrin. It is believed that the unique composition of the corneocytes and lipids and their arrangement within the stratum corneum (SC) accounts for its unusual physical properties[1-4].

Although the arrangement of the lipids and corneocytes (protein) within the stratum corneum and their general percentage compositions are known, the diffusion and binding of compounds through the SC have not specifically been identified. Furthermore, while many believe that the intercellular bilayers of lipids within the SC accounts for the relative impermeability and elasticity of skin, the effect of the keratin on transport within this lipid medium is yet unknown. The lack of knowledge of these properties is due to many factors. One of the main factors is that the stratum corneum is not comprised solely of lipids and corneocytes. Hair follicles and sweat glands occasionally interrupt the lipid and protein continuum. Therefore, when measurements are conducted on the skin, these two elements eliminate the possibility of determining the diffusive properties of only the lipid and protein components. Although some research has been conducted on only the lipid/protein region of the skin, a more in-depth analysis is needed.

In order to perform this analysis without hair shafts and sweat glands present, an experimental model approach that creates mixtures similar to the SC may be used which can provide accurate measurements of the diffusive and interfacial nature of only the SC. The purpose of our experiments and analysis is to determine the diffusive and binding properties of the stratum corneum through the use of protein, cross-linked protein, and possibly lipid/cross-linked protein models. By generating models that mimic the structure and composition of the protein and lipids within the SC, accurate information can be provided for some of the mechanisms of mass transfer through the stratum corneum. This task will be challenging in the respect that many specific parameters, spatial aspects, and composition requirements must be taken into account in order for an accurate model to be generated and analyzed. However, once complete, the experimental models should provide for an excellent system for understanding the physical properties of the SC. Furthermore, a comparison to established theoretical models will be conducted in order to aid in the interpretation of the experimental results.

The first and main objective of the proposed analysis will be to develop accurate protein models of the stratum corneum and to determine their overall diffusive properties. The motivation behind choosing protein models as opposed to lipid models is that so little is known about the properties and effects of the proteins within the SC. Even though the percentage of lipid regions within the SC is only 14%, this medium controls many aspects of transport and the mechanical strength of the skin. Although it is researched that the lipids within the stratum corneum facilitate in the diffusion of the hydrophobic compounds through the skin, the role of the protein regions of the stratum corneum in the facilitation of hydrophilic (ionic) molecules through the skin is yet to be concluded. Therefore, the hydrophilic region of the SC is a phase that has not been extensively studied, and an in-depth analysis of the corneocyte's effect on the diffusion and relative binding of compounds should provide useful information.

The first corneocyte model developed will contain keratin and water. Keratin is used in the experimental model because over 80% of the corneocyte is comprised of this protein. The keratin used in the analysis will be from an actual human epidermis in order to ensure accuracy (purchased -from Sigma Chemical Co.). The ratio of keratin to water in the first mixture will model the percentage amount of corneocytes within the SC. Due to the fact that this mixture will mimic the percentage composition of corneocytes in the SC, it is proposed that this mixture will provide the most accurate reflection of the effect of hydrophilic components on transport within the SC. Furthermore, other keratin/water mixtures will be developed in order to gain better understanding of the effects keratin has on the parameters discussed below.

The diffusive and binding properties of water in these mixtures of keratin and water will be analyzed using Nuclear Magnetic Resonance (NMR). The first series of NMR experiments will measure the effective self-diffusion of water within the keratin. Through these experiments, information will be obtained concerning the effect keratin has on the rate that water diffuses through the system. This data is important in the respect that conclusions can be made concerning whether keratin helps the lipids of the SC in controlling the rate at which water permeates through the SC or if it provides an excellent pathway for water diffusion.

The second parameter that will be analyzed using NMR is determining the interfacial properties of keratin and water. It has not been concluded in research whether keratin binds water to the corneocytes, thereby hindering water's complete transport through the system, or if water is permitted to simply dissolve through the keratin. This parameter will be determined through the use of T1 relaxation (spin lattice) experiments. These NMR experiments will provide insight into the binding and interfacial properties of keratin on water, and allow for an overall interpretation to be made concerning water's mobility within the corneocyte.

Once the data is analyzed, it will be compared to the theoretical models. The theoretical models used for comparison will use the fact that the solution created contains only hydrophilic properties[6]. The overall results of the theoretical and the experimental investigations will aid in the determination of some of the effects keratin has within the two-phase system of the stratum corneum.

In order to further understand the effect of the corneocyte compounds within the SC, a mixture of cross-linked protein will be used in conjunction with the keratin and water mixture. The reason for this analysis is due to the fact that the corneocytes within the lipid medium are cross-linked by the protein fillaggrin. Unfortunately, fillaggrin is difficult to obtain and must be used sparingly for the analysis. Therefore, another cross-linking protein (glutaraldehyde) will be used for most of the experiments. Even though it is unknown if the glutaraldehyde will cross-link the specific protein of keratin, glutaraldehyde is a protein known for being able to cross-link most proteins and should perform appropriately. Therefore, once the cross-linking occurs, the resulting mixture may be similar to the structure of the hydrophilic domains within the SC.

T1 relaxation and water self-diffusion experiments will then be conducted on the mixture using NMR. Through these series of NMR experiments, an interpretation can be made not only upon the effects of the entire hydrophilic region within the compound, but also on the effects of the extent of cross-linking on the binding and diffusive properties of water to keratin. Once experimental results are completed, the data will be analyzed in the context of a theoretical model that contains parameters for cross-linking effects[6]. The correlation of the theoretical and experimental results will provide a better understanding of not only the effects of cross-linking on diffusive properties, but also the effect of the entire hydrophilic region of the stratum corneum on the skin's permeability.

If time permits and the experimental results present a reasonable analysis for the protein region of the SC, a mixture will be attempted that combines protein/glutaraldehyde/lipids. This experiment will prove challenging, in the respect that the lipid mixture required must contain not only similar percentage compositions of the major lipids that are present in the SC, but also a similar structure. The structure of the lipids within the SC is found to be arranged as lamellar, possibly bilayer, sheets. They are mainly comprised of cermamides, free fatty acids, and cholesterol. Similar mixtures of only skin lipids have been created; however, the laboratory time and effort required to generate these bilayer sheets is extensive[7-10].

An accurate lipid model that does not require such extreme laboratory work will be attempted, through the use of these three lipids and water in various concentrations and at the physiological pH of skin, and then combined with the keratin/glutaraldehyde mixture. Whether this model can be created is yet unknown, for this two-phase mixture modeling the SC has yet to be created. However, if the model of lipids and keratin is possible, NMR experiments similar to those performed on the other models will be conducted on the mixture. Due to the fact that the SC is a two-phase mixture, this model should provide for the most accurate results. This data, if obtained, should provide extremely useful information and insight as to the relative permeation of the SC. Once the NMR data is complete, it will be compared to a theory that contains an analysis of spatial averaging along with the knowledge that the model is a two-phase system.

Although many experiments are planned with numerous models, the main objective of this analysis is to determine the effect of hydrophilic compounds within the SC by creating a keratin mixture of accurate composition and structure. Once a strong correlation is developed between the experimental and theoretical data, the results should provide us with a better understanding concerning the mechanisms of diffusion and binding of compounds within the protein components of the stratum corneum.

Literature Review:

1. Franz, Thomas, Tojo, K., Shah, K., and Kvdonieus, A. Transdermal Delivery.

2. Smith, Eric. Percutaneous Penetration Enhancers, Treatise on Controlled Drug Delivery, Agis Kydonieus, Marcel Dekker, Inc., New York, 1992.

3. Edwards, David and Langer, Robert. A Linear Theory of Transdermal Transport Phenomena, *J of Pharvm. Sci.*, 83, 9 September 1994, 1315- 1334.

4. Potts, Russell and Francoeur, Michael. The Influence of Stratum Corneum Morphology on Water Permeability, *J Invest, Dermatol.* 96, 1991, 495-499.

5. Pykett, Ian. NMR Imaging in Medicine, *Sci. Amer.,* May 1982, 78-88.

6. Penke, Brigita. Masters Thesis, Department of Chemical Engineering, FAMU-FSU College of Engineering, Florida State University (in progress), 1997.

7. Bouwstra, J.A., Thewalt, J., Gooris, G. S., and Kitson, N. A Model Membrane Approach to the Epidermal Permeability Barrier: An X-Ray Diffraction Study, *Biochemistry*, 36, 1997, 7717-7725.

8. Bender, Max. Interfacial Phenomena in Biological Systems, Surfactant Science Series, Vol. 39, 3-32, Marcel Dekker, Inc., New York, 1991.

9. Rhein, Linda, Simion, F., Froebe, C., Mattai, J., and Cagan, R. Development of a Stratum Corneum Lipid Model to Study the Cutaneous Moisture Barrier Properties, *Colloids and Surfaces*, 48, 1990, 1-11.

10. Wertz, Philip, Abraham, W., Landmann, L., and Downing, D. Preparation of Liposomes from Stratum Corneum Lipids, *J. Invest. Dermatol.*, 87, 582-584, 1986.

FORM 3 -- ESTABLISHMENT OF SUPERVISORY COMMITTEE FORM
(Must be submitted to the URP Director with the Prospectus.)

Undergraduate Research Project (URP)
Department of Chemical and Biomedical Engineering
FAMU-FSU College of Engineering

Name_________________________________ _______________________________________

Address____

Phone_________________________________ Email__________________________________

This form serves to establish the supervisory committee for the Undergraduate Research Project in the Department of Chemical Engineering, FAMU-FSU College of Engineering. Under the direction of the faculty advisor, the student's URP supervisory committee will oversee the progress of the project and will approve the final project report and oral presentation. A minimum of three committee members are required, one of whom may be from outside the Department of Chemical Engineering.

URP Topic____

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Academic Terms of URP (e.g., Fall 2013 & Spring 2014)__________________________________

URP Faculty Advisor____

URP Committee Member____

URP Committee Member____

URP Committee Member (optional)____

Approval Signatures With Dates

_________________________________ _______________________________________
URP Student | URP Program Director

_________________________________ _______________________________________
URP Faculty Advisor | Undergraduate Committee Chair

FORM 4 -- COMPLETION OF FIRST TERM FORM
(Must be submitted when grades are due for the particular term.)

Undergraduate Research Project (URP)

Department of Chemical and Biomedical Engineering
FAMU-FSU College of Engineering

I certify that the following student

Name________________________________ ____________________________________

Address____

Phone_______________________________ Email________________________________

has completed the academic requirements for the first term of the Undergraduate Research Project in the Department of Chemical Engineering, FAMU-FSU College of Engineering. This student will continue the URP for the second (and third, if applicable) term(s) for a maximum of six credit hours, which will be counted for the two senior-level Chemical Engineering Electives.

URP Advisor____

URP Topic____

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Academic Terms of URP (e.g., Fall 2013 & Spring 2014)______________________________

URP Prospectus Submitted (Initial and Date)____

URP Interim Project Report Submitted (Initial and Date)_______________________________

Approval Signatures With Dates

____________________________________ ____________________________________
URP Student | URP Program Director

____________________________________ ____________________________________
URP Advisor | Undergraduate Committee Chair

FORM 5 -- COMPLETION OF FINAL TERM FORM
(Must be submitted when grades are due for the particular term.)

Undergraduate Research Project (URP)

Department of Chemical and Biomedical Engineering
FAMU-FSU College of Engineering

I certify that the following student

Name________________________________ ________________________________

Address____

Phone_______________________________ Email___________________________

has completed all academic requirements for the Undergraduate Research Project in the Department of Chemical Engineering, FAMU-FSU College of Engineering. The URP will be counted for the two senior-level Chemical Engineering Electives for a maximum of six credit hours.

URP Advisor____

URP Topic____

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Academic Terms of URP (e.g., Fall 2013 & Spring 2014)_____________________

URP Project Final Report Submitted (Initial and Date)______________________

URP Oral Presentation (Initial and Date)_______________________________

Approval Signatures With Dates

________________________________ ________________________________
URP Student URP Program Director

________________________________ ________________________________
URP Advisor Undergraduate Committee Chair