· PROPOSAL I

SABBATICAL REQUEST FORM

Please complete the following information to enable the Sabbatical Review Committee to consider your request. Answer all questions. This form must be received in the Office of the Vice President for Academic and Campus Affairs by October 15.

Name: [redacted]

Address: [redacted]

Telephone #, Home: [redacted] College Extension: [redacted]

Period of previous sabbatical, if applicable: N/A

List of unpaid leave (s) of absence: From N/A To N/A

Preference for sabbatical leave (rank your preferences 1st, 2nd, 3rd):

Full Year N/A

Fall Semester First Preference

Spring Semester Second Preference

(Note: You must accept a full-year sabbatical if you rank it among your preferences and it is awarded.)

Statement of Purpose (See format provided for additional instructions.)

The statement of purpose for the sabbatical shall demonstrate the proposed benefit to individual professional growth or to a college program. "Individual professional growth" is defined as pursuit of knowledge related to the faculty member's discipline or duties at the College, to the teaching profession, or to an approved training program.

Please be advised that within eight weeks after the return from you sabbatical, you must submit to the President a report of your activities during your sabbatical leave. Forms for this report will be provided upon award of the sabbatical. Also note that you are obligated to return to the College for one year following the sabbatical. The failure to return or to complete the sabbatical as awarded can result in a financial liability for the return of salary paid during the sabbatical.

Signed: _____

Date: _____

10/11/2012

REQUIRED FORMAT

SABBATICAL APPLICATION: STATEMENT OF PURPOSE

Abstract for Publication/Board Resolution:

The purpose of this sabbatical is to develop a test for the additive and synergistic effects of toxins in *Caenorhabditis elegans*. A toxicity test in *C. elegans* that is established will be modified to include additional toxins in preparatory treatments. The novel approach to toxicity testing in the project lies in the addition of synergistic toxins to the testing regimen in an animal in which the effects of a wide range of toxins can be detected including carcinogens, clastogens, endocrine disruptors, mitogens, mutagens and teratogens.

A. Narrative on Activity

I will be conducting research pertaining to the additive, synergistic and cumulative effects of toxins in the soil nematode *Caenorhabditis elegans*. I intend for the findings of this research to result in a publication in a peer reviewed science journal, and for the establishment of a laboratory methodology that will result in the continued production of scientific data with subsequent publication. I also intend for this research to result in the development of a laboratory science exercise for embedded research in biology laboratory courses. It is necessary to do this as a sabbatical because the time necessary to perform the experiments and interact with the collaborative partners and laboratory at this outside location could not fit into a SCCC teaching schedule, and the laboratory facilities and collaborative expertise for this project are not available here at SCCC.

In preparation for this work I completed the 'Silencing Genomes' course during the summer of 2011 at Cold Spring Harbor Laboratories Dolen DNA Learning Center. This course was designed to train scientists to work with *C. elegans* in the laboratory for research purposes through the application of RNA interference (RNAi). I have also established collaboration with Dr. Fernando Nieto at S.U.N.Y. Old Westbury who works with the testing of arsenic toxicity in *C. elegans*. Systems for arsenic detoxification are found in all organisms (Rosen 2002). *C. elegans* mutants have been found to be sensitive to arsenic toxicity (Liao & Yu 2005), and mutations have been found that compromise arsenic detoxification in *C. elegans* (Vatamaniuk et al. 2002). Additionally, the training for my Ph.D. degree required me to work with toxicological testing in micro-organisms. Dr. Nieto has been testing arsenic toxicity in *C. elegans* for many years. I will be using a modification of the established protocol in his laboratory by adding additional toxins to a treatment already containing arsenic and running the experiments side by side with treatments containing only arsenic and controls. Toxins are typically regulated based on their sole exposure against the natural background. Biological pathways can be affected by more than

one toxin, and multiple biological outcomes have been detected by exposure to individual toxins (Roh et al. 2007). Different pathways simultaneously affected could result in a synergistic outcome. With more than one hundred thousand chemicals on the marketplace (Kuo et al. 2012), and many commonly used food additives being of toxicological concern (Kobylewski & Jacobson 2012), there is room for a wide margin of era when considering the traditional regulatory methods.

The protocol for these experiments requires the preparation, growing, harvesting and synchronization of the *C. elegans* worms. This is followed by single or double toxins treatments and controls before an overnight incubation period. The subsequent day requires the identification and counting of mutant and non-mutant surviving worms.

B. Professional Benefit to Applicant

This activity will provide me with the training necessary to work with *C. elegans* and current toxicological testing methodology. It will also provide me with the time, collaborative expertise, and research laboratory necessary to develop a protocol for the testing of the synergistic effects of toxins. In addition it will provide the opportunity to develop a permanent collaboration with a laboratory for ongoing research. It will result in the collection of data necessary to prepare a manuscript for publication in a peer reviewed journal, and a methodology and collaboration for the continuous collection of data and additional publications.

This activity will also afford the applicant the opportunity to professionally practice the scientific method in accord with training within the applicant's discipline. Such practice is necessary for maximizing continued competence within the field. Laboratory work and research design is not just based on knowledge but skill. Continuing practice of such skill maintains competence within the fields of science and the ability to design and implement new pedagogy into the laboratory curriculum.

C. Benefit to College

The result of the findings of this research will be disseminated to the student population at SCCC through Colloquia presentations at the three campuses. It is also expected to result in annual presentations at Colloquia due to the continued data collection, analysis and publications. In addition, the development of toxicity testing in *C. elegans* can be used to develop pedagogy for embedded research in SCCC biology laboratory courses. Rios-Velazquez et al. (2011) developed an undergraduate research workshop in which students did experiments with soil micro-organisms to collect novel data, and "pre- and post-workshop assessments indicated student learning gains in technical knowledge, skills and confidence in a research environment". This work was published in the *Journal of Microbiology & Biology Education*. My project is expected

to result in the continued publication of both research papers in journals of toxicology and in journals of education as well.

In preparation for developing an embedded research project for SCCC I attended the Council on Undergraduate Research (CUR) conference held at Queensborough Community College this year (www.cur.org). I then designed and implemented an embedded research project for the Principles of Biology (BIO101) course at SCCC on the Michael J. Grant Campus. I then developed the *Science and Technology Undergraduate Research Notes (Saturn) Journal* (www.saturnjournal.org), and forty four students in my classes last semester published manuscripts in the *SATURN Journal.*

SCCC benefits from the maintenance of the skills of its faculty who teach these skills to the student population. Keeping these skills competent in faculty is necessary to provide up to date instruction and curriculum development in science and technology.

References:

Kobylewski, S., Jacobson, M. F., 2012. Toxicology of food dyes, *Int. J. Occup. Environ. Health*, Jul-Sep; 18(3), 220-246.

Kuo. C. H., Yang, S. N., Kuo, P. L., Hung, C. H. 2012. Immunomodulatory effects of environmental endocrine disrupting chemicals, *Kachsiung J. Med. Sci.* July; **28** (7 Suppl.): 37-42.

Liao,V. H., Yu, C. 2005. *Caenorhabditis elegans ges-1* confers resistance to arsenic-induced oxidative stress. 2005. *BioMetals*, **18**, 519-528.

Rios-Velazquez, C., Williamson, L. L., Cloud-Hansen, K. A., Allen, H. K., McMahon, M. D., Sabree, Z. L., Donato, J.J., Handelsman, J. 2011, Summer workshop in metagenomics: one week plus eight students equals gigabases of cloned DNA. *Journal of Microbiology & Biology Education*, **12**, 2, 120-126.

Roh, J., Jung, I., Lee, j., Choi, J. 2007. Toxic effects of di(2-ethylhexyl)phthalate on mortality, growth, reproduction and stress-related gene expression in the soil nematode *Caenorhabditis elegans*. *Toxicology*, **237**, 126-133.

Rosen, B. P. 2002. Biochemistry of arsenic detoxification, *FEBS Letters*, **529**, 86-92.

Vatamaniuk, O. K., Bucher, E. A., Ward, J. T., Rea, P. A. 2002. Worms take the 'phyto' out of 'phytochelatins'. *TRENDS in Biotechnology*, **20**, 2, 61-64