Lehman College Plant Research Center

RESOLVED, that the Plant Research Center be established at Lehman College in accordance with the Policy Guidelines on Research Centers and Institutes set forth by the Board of Trustees.

EXPLANATION: The Plant Research Center will serve to facilitate highest-level research and the education of future experts in the field of plant sciences at Lehman College and intensify our collaborations with The New York Botanical Garden. The center will expand and disseminate knowledge in the area of plant sciences by engaging undergraduate and graduate students in faculty/student collaborative research.

A copy of the full proposal is available at the OAA.

The proposal was approved by Lehman College Senate on _____

_____
Anny Morrobel-Sosa, Provost

Plant Research Center

Preamble

Plants are the backbone of all life on Earth. Plants produce 98% of atmospheric oxygen through photosynthesis. Everything we eat comes directly or indirectly from plants. One quarter of prescription drugs come directly from plants or are plant derivatives. Given the importance of plants in every aspect of the history of life on earth and of our lives, humans study plants to understand processes that have been and are critical to our own survival and to the health of the planet. An advanced understanding of the intricate interconnections between humans and plants has become a priority objective for our society. Given that 70% of the genes in plants and humans are identical, it is not surprising that research on plants is associated with tremendous benefits for humans. For example, genomic studies of plants have given us significant insights and information that is highly relevant for cancer research.

Three recent developments, namely the development of new technologies (e.g., Advances in Plant Molecular Biology and DNA Barcoding for identification and conservation), climate change, and the issue of invasive species, urgently necessitate an increase in our efforts to advance plant research. The Plant Research Center at Lehman College will provide an environment that will let us meet this demand. The state-of–the-art research facilities at Lehman College (New Science Hall) and at The New York Botanical Garden, and the combined expertise at these institutions provide an ideal infrastructure to facilitate groundbreaking and transformative research.

1. Mission Statement

The Plant Research Center at Lehman College will promote interdisciplinary research on a wide variety of topics related to plants and utilizing plants for scientific advancements in areas relevant to human endeavors. The Center will provide training, education, and outreach to produce a diverse scientific workforce with interdisciplinary expertise coupled with knowledge of relevant legal, regulatory, and economic issues. The Center will contribute to the economic growth of New York City, New York State, and the Tri-State region through advances in plant research. It will be an important regional, national, and international scientific and technological resource. The Center will make significant contribution to STEM education for underrepresented minority students in the Tri-State region.

Rationale:

Plants provide the food we eat, including essential nutrients to support health and prevent disease, and plants are a vast and untapped source of new drugs; indeed, a significant percentage of our current prescription drugs still come from or originally came from plants. The Center will provide opportunities to develop new collaborations, attract research and training funds, and provide a formal “face” and greater recognition to the plant research strength at Lehman College, CUNY. With the establishment of the Center, plant research at CUNY will thus have greater visibility to the outside world, including granting agencies and the public. In an era where diversity of the scientific workforce is essential, the Center will make a significant impact on the scientific workforce through interdisciplinary training opportunities for students and researchers at all levels. The educational opportunities offered by the Center are not intended to compete with any existing program or course at Lehman College. On the contrary, they will provide a complementary setting for high-level education and training in STEM fields. The educational and

research opportunities, scholarships and travel funds made available to students through the Center will do much to attract high-quality students and enhance retention and graduation rates.

2. Goals:

The Center will provide a focal point for promoting interdisciplinary research, education, and training that links plant research with all aspects of the human condition.

Research. The Center will drive synergistic and interdisciplinary research that intersects plant biology and human endeavors. The Center will facilitate research needed to address the growing challenge of global food security in the face of climate change. The Center will facilitate discovery of new plant-derived drugs for treating and preventing human diseases. The Center will draw in related disciplines, including conservation, policy, and business, thus broadening traditional research programs. The Center will include research-active faculty at Lehman College and neighboring institutions who are committed to interdisciplinary research and collaborations that involve plants, including the scientists at The New York Botanical Garden, who have enjoyed a significant and meaningful relationship with Lehman College and CUNY for over 45 years. Establishing a framework and infrastructure for these collaborations in the form of the proposed Plant Research Center will be the foundation for increased success of the participating institutions in terms of factors such as acquisition of external funding and access to highly qualified students. Along with faculty who conduct research directly on plants, the Center will involve non-plant biology faculty at Lehman and in other CUNY Colleges (such as animal physiology and neuroscience, math and computer science, chemistry, bioinformatics, environmental biology, structural biology, chemical engineering, education, policy, etc.), interested in exploring uses and research involving plants, such as in discovery of novel drugs, genes, and compounds, uses as alternate bioreactors and new energy sources, global health problems, conservation, etc. Close collaborations with the newly established Center for Theoretical and Computational Sciences at Lehman College will create synergy effects that will benefit both centers.

Education and training. In an era where diversity of the scientific workforce is essential, the Center will make a significant impact on the scientific workforce through interdisciplinary training opportunities for students and researchers at all levels. The Center will develop a pipeline to attract and train high-potential and talented students leading them to successful careers with interdisciplinary expertise related to plant sciences and human health. This pipeline will begin with pre-College leading to advanced degrees and beyond. The Center will provide financial support, including student scholarships, to support education and research training at Center labs. The Center will develop new educational opportunities and provide mentoring for students in the framework of research projects leading to student/faculty collaborative publications, presentations at professional meetings, and engagement in the larger scientific community.

3. Center Functions (activities in support of goals)

Center activities, such as research seminars, symposia, and collaborative grants, will provide opportunities for interaction among faculty, staff, and students at Lehman College and at The New York Botanical Garden. Interdisciplinary activities will fuel cross-collaborative research and

education for faculty and students. The Center will develop linkages with the local community through public lectures and programs for grades K-12. The Center will form partnerships with local universities to enhance career and learning opportunities for Lehman undergraduate and graduate students. The Center will develop linkages with the international scientific community to expand the geographic breadth of Center research and educational activities, via distance technology and/or through creation of scientist and student exchange opportunities. The Center will develop a pipeline to provide research experience for undergraduate students and mentor them toward graduate studies and the pursuit of a PhD. The Center will provide stipends and travel support for undergraduate students, graduate students and postdocs affiliated with the Center, and funding for external visitors, both short- and long-term. The Center will sponsor workshops and courses in career development that will benefit faculty and student participants. The Center will facilitate collaborative research and educational grant proposals submitted by the Center's members. The Center will also develop new sources of funding, in particular private and corporate donations solicited to support faculty research, endowed Chair positions, research infrastructure, faculty and student travel to scientific meetings or for research collaborations, and for student scholarships. Other Center initiatives and resources such as access to instrument facilities, expertise, and intellectual property, will catapult Lehman as a leading institution that is recognized in the local community, the New York metropolitan region and internationally.

Faculty from Lehman College involved in the Center may be able to obtain release time to conduct grant-funded activities. A postdoctoral pool available to Center labs will provide novel expertise to advance and expand the interdisciplinary breadth of Center research programs. These postdocs will also mentor students and thus provide students with access to training in novel and upcoming areas of research. The postdocs themselves will benefit from the interdisciplinary training environment and teaching opportunities that together will aid in their career development. Center technical staff will support faculty and student research, and facilitate development of an income stream from outside use of Center equipment and access to Center expertise.

The Center will provide educational opportunities for undergraduate and graduate students. For example, the Center will offer research honors courses, taught by Center faculty with the active involvement of graduate students. These are envisioned as one- or two-semester courses on topics that could vary from year to year. The courses would be designed to provide students with advanced training needed to engage in research using the latest technologies and approaches. Through use of distance technology, courses could attract students from other CUNY campuses. The Center will provide mentored research opportunities to undergraduate, Masters, and PhD students, building on the topics covered in the honors courses to provide a much-needed pipeline from education to research. The Center will engage with local high schools and the Lehman community to identify and recruit suitable students, with a particular emphasis on women and students from underrepresented groups. The Center will collaborate with the Macaulay Honors College and identify a potential pool of students. The Center will draw Macaulay students interested in the sciences to Lehman College. Also, the Center will partner with the Bronx Institute to attract the best students from the Bronx. The Center will attract and retain high-quality students by offering prestigious scholarships.

4. Personnel and Administrative Structure

The center's personnel will consist of faculty members, student members, an executive committee, and a director. An external advisory board will be established within three years after the official opening of the center.

The center will be led by a Director and an Executive Committee. The Director will provide administrative leadership for the Center, supported by an Executive Committee which shall provide academic and scientific oversight. The Director will be an internationally recognized leader in plant biology who will be hired to be a tenured Full Professor in Biological Sciences at Lehman College, CUNY. The Director will serve a term of three years with the understanding that the appointment can be renewed, and the Director may establish an affiliation with The NYBG.

The Director of the Center will be appointed by the President of Lehman College upon recommendation from the Provost, Dean of NSS, and Executive Committee. The Director will lead the Center, in consultation with the Center Executive Committee (CEC), to develop Center initiatives such as seminar series, symposia, and collaborative research grants. The director will promote and facilitate collaborative research within and outside of the center. The Director will play a leading role, together with the CEC, in the development of a Ph.D. program in Plant Biology at Lehman College, including outreach and fundraising. The Director will oversee the Center support staff. The Director will meet with the CEC at least once per semester and with the EAB at least once per semester.

The CEC will consist of five people: The Director and four center members. Two Members of the CEC must be full-time, tenured or tenure-track faculty at Lehman College, and two members will be from the scientific curatorial staff of the NYBG who meet the criteria for membership in the Center. A student will be selected to serve as a non-voting representative to the CEC. The initial term lengths of the inaugural CEC faculty members will be one year. Following that year, two members will be elected for two-year terms and the two others will be elected for three-year terms. Thereafter, all faculty members will serve in the CEC for three-year terms. Members of the CEC including the director can be reelected for up to two consecutive terms. Future members of the executive committee will be elected by the center's faculty members. Designation of a Deputy Director may be necessary as the Center expands in the number of participants and in the extent (breadth) of research activity conducted by the Center. Future center directors will report to the Dean of NSS and the Vice Provost and Dean of Research who will serve as ex-officio on the CEC. At the end of each academic year the Director will prepare an annual report which will be reviewed by the CEC then submitted to the Dean of NSS and the Vice Provost and Dean of Research with copies to the Provost and Senior Vice President for Academic Affairs and the President.

External Advisory Board (EAB):

An EAB will be established and charged with soliciting funds from private philanthropic sources to support Center activities. The EAB will be composed of individuals from the community who are committed to the mission of the Center. The External Advisory Board (EAB) will work together with the Director to identify and obtain external funds from private philanthropic sources, especially from nonfederal sources, and to be used specifically for the Center. The EAB will work to raise an endowment specifically for the Center (e.g. endowed Chair positions and funds to permanently support students at the undergraduate, graduate and postdoctoral level) as well as to raise funds to support Center activities for research and training. These funds will support

Center research and operating expenses, the postdoctoral pool and student stipends, and other expenses approved by the CEC.

5. Membership

Faculty membership

Lehman faculty with research and focus interest related to mission and focus of the center from all disciplines will be considered for faculty membership in the center. Faculty membership in the center will be decided by the executive committee, based on the following criteria:

- Qualification and readiness to support and mentor highest-level student research in plant sciences or theoretical biology.
- Record and/or potential to attract substantial external funding.
- Scholarly record that has received high recognition.

Candidates under consideration for the inaugural CEC will be Dr. Eleanore Wurtzel, Dr. Edward Kennelly, Dr. HaiPing Cheng, Dr. Renuka Sankaran, and Dr. John Zheng from the Department of Biological Sciences at Lehman College and from the NYBG Dr. Lawrence Kelly, Director of Graduate Studies, Dr. Dennis Stevenson, Vice President for Laboratory research, Dr. Fabian A. Michelangeli, Associate Curator Institute of Systematic Botany, and Dr. Michael Balick, Vice President for Botanical Science and Director of the Institute of Economic Botany.

Faculty members of the center are eligible for the following benefits:

- Pre-negotiated reassigned time that is dependent on the amount of individual or collaborative external funding.
- Reassigned time that is awarded by the center's executive committee and financed through the center's funds.

Faculty members of the center are held accountable to the following expectations:

- Ongoing record of high-level scholarly activity, student mentoring, and individual or collaborative acquisition of substantial external funding.
- Alignment with the goals of the center and engagement in center activities.

Student membership

Student (undergraduate and graduate) membership in the center will be decided by the executive committee, based on the following criteria:

- Availability of funding to support students
- Evaluation of the student's potential to successfully pursue an academic career in plant sciences or theoretical biology based on the following criteria:
  - High school and/or college grades
  - Letters of recommendation from teachers and faculty
  - Student's application materials (including an essay)
  - Interview

Student members of the center will receive

- Individual mentorship by a faculty member
- An annual stipend in addition to existing financial aid

External Advisory Board (EAB):
The EAB will be composed of members of the community willing to make a commitment to aid in fund-raising specifically for the Center. The goal will be to assemble an EAB of at least 4 members. The Center Director will serve as an additional member of the committee. A committee chair will be elected among the 4 members.

Sections 4 and 5 of this document will serve as the center's bylaws, which may be amended by a two-thirds vote of the CEC.

6. Required Resources

A) New faculty line: One faculty member of distinction at the rank of full professor will be required to increase the existing and strong core of plant biologists conducting research in plant biochemistry and serve as director of the center. The position will be used to target funded researchers with potential to build strong, externally funded programs that are synergistic with the existing or developing research in plant biology.

Justification: Currently, there are five potential participants with research expertise related to the Center focus on plant biochemistry. However, this is not a large enough number for a critical mass needed for all of the associated activities envisioned for the Center. If one person takes sabbatical and two are involved as Chairs of PhD programs, only two remaining faculty are available to run seminars, courses, etc. Moreover, we are missing expertise in certain critical areas relevant for both research training and for effective cross-disciplinary collaborations. By adding faculty in the areas below, the Center would be better positioned to be highly competitive for student training grants (e.g. NSF IGERT grants; NIH training grants) and collaborative research grants. We envision that these individuals could also contribute to other educational needs of the Biology Department as well as contribute to novel and synergistic collaborations that might arise with faculty in other departments at the College (e.g. Math and Computer Science; Chemistry; Health Sciences).

Areas of expertise that would enhance the current strengths of Center faculty participants:
Synthetic biology and metabolic engineering. Areas might include enzymology, protein modeling, flux analysis, structural biochemistry, enzyme design, development of metabolite sensors (e.g. riboswitches, protein-based sensors). Preference would be for an individual working in plant systems or computational biology; areas of research might include systems biology, bioinformatics, and genomics or other areas of expertise that complement areas of current research activity at the NYBG.

B) Stipends for students: During the first years of operation, the center expects to host approximately ten student members at any given time. Required funding: $150,000 annually.

C) Student research lab/communal area: A center's hub will be a research lab/student lounge that will be used together with student members from the Center for Theoretical and Computational Sciences (anticipated location: Gillet Hall). It will be equipped with state-of-the-technology

computer workstations and appropriate software. The center requires $10,000 in startup funds for furniture and computer workstations. Students will collaborate with their faculty mentors in the existing plant science research labs.

D) Faculty reassigned time: During the first years of operation, the center expects to include approximately five faculty members at any given time who will be given reassigned time depending on their level of engagement. The center will require funds to hire adjuncts to compensate on average five credits reassigned time per faculty member: $6,000 per faculty member times 5 faculty members = $30,000 annually.

E) Travel funds, visiting scientists and symposia: The center expects to spend approximately $15,000 annually. The first year's funds will come from a mixed source: the Provost, Biology Dept., and the Dean's office.

F) Administrative support: Administrative support for the center will initially come from the Department of Biology. Potential changes to this arrangement will be discussed later depending on the availability of funding and size of the program.

Funding required for the first five years of operation:

The allocation of the resources will be decided by the center's executive council in alignment with the center's mission and vision.

	Academic Year				
Item	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**
Stipends for students	$152,000	$160,000	$170,000	$180,000	$190,000
Student research lab	$10,000	$20,000	$20,000	$15,000	$15,000
Faculty reassigned time	$30,000	$40,000	$50,000	$60,000	$70,000
Travel funds	$15,000	$15,000	$15,000	$15,000	$15,000
Administrative support	$20,000	$20,000	$20,000	20,000	20,000
Office supplies	$5,000	$5,000	$5,000	$5,000	$5,000
Total	**$232,000**	**$260,000**	**$280,000**	**$295,000**	**$315,000**

7. Funding Plan

The center will receive financial resources for its operation from

- Allocations from CUNY / Lehman College (including stipends for students that will be earmarked for that purpose by Lehman Foundation)
- Student support from successful collaborative or individual external research grants from faculty members
- Overheads from successful collaborative or individual external research grants from faculty members
- External educational grants
- Foundations, donors, and corporations
- Grant to establish a center …NIH Bridges to the PhD; USDA STEAM grants

- In-kind contributions for Graduate Student support from the NYBG graduate studies program.

A projection of financial support over time can be taken from the following table and illustration.

	Academic Year				
	2015/16	**2016/17**	**2017/18**	**2018/19**	**2019/20**
College Allocations					
Lehman College, Office of the Provost	$100,000*	$15,000	-	-	-
Lehman College, NSS (OTPS)	$4,000	$4,000	$4,000	-	-
Lehman College, NSS Adjunct Budget	$10,000	$20,000	$10,000	-	-
Overhead returns from research grants	$20,000	$30,000	$40,000	$50,000	$60,000
External Sources					
Grants	$58,000	$110,000	$110,000	$120,000	$130,000
Foundations, donors, companies	$40,000	$81,000	$116,000	$125,000	$125,000
Total	**$232,000**	**$260,000**	**$280,000**	**$295,000**	**$315,000**

*Start-up fund for new faculty

Explanation.

Lehman College's contribution to the budget will decrease in years two and three and be eliminated entirely from year four onward as more funds will become available from the other sources.

The center's director, in collaboration with the Office of Institutional Advancement, will solicit funds for student scholarships and other activities from private donors, corporations, and foundations. These scholarships, and even the center itself, will provide naming opportunities that may be used to appeal to donors. A strategy paper to approach companies to fund the center's student scholarships and other STEM related initiatives at Lehman College (Science Partnership for the Bronx) is in the works.

The faculty members of the center will apply for external educational funding for the initiative. Relevant funding opportunities were already identified by the director of the Office of Grants and Sponsored Programs.

Admission of students and allocation of reassigned time will depend closely on the availability of funding. The center director is responsible for the budget and will ensure as far as possible that students who are admitted to the center will receive the center's support up to the completion of the doctorate. "Rainy day funds" will be accumulated to ensure students' ongoing support for years in which external funding falls short of the expectations.

8. Timeline:

May 2015 onward:

- Determination of founding members of the center (Responsible: NSS Dean in collaboration with senior scientists from Lehman College).
- Discussion of the initiative with the Lehman College administration and collaborative definition of specific framework (Responsible: NSS Dean and founding members).
- Identification and acquisition of suitable candidates for center membership at Lehman College (Responsible: NSS Dean and founding members).
- Determination of the center's executive committee (Responsible: Center Director and members).
- Acquisition of external funding for the initiative in the form of individual research grants and collaborative federal and private sponsoring to ensure funding for the support of students (Responsible: Center Director and members).
- Admission of students to the center based on the availability of externally acquired funding (Responsible: Center Director and members).

January 2016:

- The Center officially opens, with the award of inaugural student scholarships.