Green Grant Proposal 2019 – IDM.Grow

Before submitting your proposal, please carefully review all grant policies and required supplementary materials detailed in the **_Green Grants Guidelines_** available on our website. This form is meant to serve as a template, and though all sections are required, you may take the liberty to include graphs, photographs, additional data etc. that help strengthen your proposal.

Answers should be concise, specific, and within the given word count. If more elaboration is critical to your proposal, please submit it as a supplementary document.

1. OVERVIEW

Project lead's name & email: Vanessa Harden, vanessa.harden@nyu.edu
Date of submission: 02/01/2020
Total Budget Requested: $17,025.90

Executive Summary:
In up to 5 sentences, please provide an overview, and highlight any key aspects of your project.

IDM.Grow is an integrated program committed to promoting sustainability and social justice within the design field by providing students the opportunity to actively engage in an impact-led design process. This program connects students with real stakeholders who are experiencing existing challenges related to agriculture and food access. The Urban Food Lab located in the MakerSpace will serve as a testing space for a selection of projects, while the IDM.Grow Lab (currently in progress) located at the entrance to the Integrated Digital Media department offers students, faculty, and visitors an opportunity to learn about AgTech through the vertical hydroponic garden, germination station, and interactive display. The Fall 2019 pilot course, "Developing Technologies for Urban Gardens," demonstrated both a need as well as a strong interest in bringing AgTech to the department.

Have you previously submitted a proposal to the Green Grants Program?
If yes, please provide the Project Name, Date of Submission, whether the grant was awarded, and whether/how this current proposal is related to your previous submission. No person may be a project leader on multiple open grants. Past Green Grant recipients are ineligible to apply again until they have completed all terms of their prior Green Grant. Each recipient is eligible to receive funding for no more than 2 Green Grants.

No, we have not submitted a previous proposal to the Green Grants Program. The Urban Food Lab, a space that will be used by our program, has been previously supported by Green Grants and has continued through outside funding. _Its financial maintenance is outside the scope of our grant application_.

Area(s) of focus:

Category	✓
Water	✓
Climate/Energy	✓
Waste	✓
Landscaping	
Purchasing	
Transportation	
Engagement	✓
Socio-Economic Sustainability	✓
Food	✓
Built Environment	✓
Innovation	✓

Other:

Classification(s):

Category	✓
Operations	
Engagement	✓
Research and/or Design	✓
Academic	✓

2. PROJECT CONCEPT & PLAN

Background & Rationale (300 words):
Articulate your reasons for undertaking this project. Explain why the issue(s) or problem(s) you are addressing is important, and how your project uniquely contributes to tackling it.

In the fall 2019 semester, Vanessa Harden ran the IDM graduate course, "Developing Technologies for Urban Gardens." This course explored alternative forms of permaculture and identified spaces for designers to develop technologies, products, methods, or systems to facilitate urban gardening. Students learned how to use their creativity and existing skills to design and produce products and systems that investigated and helped transform urban environments into green spaces. The course was both a seminar class and a production studio, and students were invited to interact with specific communities and sub-cultures in order to create user-centered designs that considered environmental factors, socio-economic conditions and cultural implications (see Supplement 2, example final presentations).

One of the projects for the course was the IDM.Grow Lab, a vertical hydroponic garden, germination station, and interactive display system designed and built collaboratively by the class over the last few weeks of the semester. As the final design launched into the implementation phase, we attracted the attention of various individuals from the NYU community, including Omar Gowayed, founder of the NYU Urban Food Lab, who suggested we expand the course into a program which would combine the IDM.Grow Lab and the goals and methods of what would be the pilot course, and use the Urban Food Lab as a platform to conduct our experiments.

An expansion of the pilot course, the IDM.Grow program is addresses multiple gaps within both IDM and NYU Tandon. While there are other agricultural engineering programs (e.g., Urban Food Labs) and real-world design courses at IDM, there is a significant lack of programming in agricultural and sustainable design, let alone connections to real challenges in this space. This program encourages students to use their studies to work on meaningful projects that promote

positive change and connects students with real stakeholders who are experiencing existing challenges related to agriculture and food access, such as Southside United HDFC (colloquially known as Los Sures) in Brooklyn, and the Ndor Eco Village in the Volta Region of Ghana; note that a full list of current partner organizations is included at the end of the proposal.

Sitting at the entrance to IDM, the IDM.Grow Lab is a point of interaction and education for the IDM community and visitors to the department. The Grow.Lab is the first and currently only garden or green space in the department. It not only promotes the health benefits that come with indoor green spaces, but through its unique hydronic garden design, promotes the opportunity for students to expand their studies to agriculture technology (something that is not yet offered in the departments). The success of IDM.Grow will forge the way for continued research and design into the field of impact-driven environmental design, a field that is becoming increasingly more important in the face of climate change and its associated challenges.

As of January 2020, the IDM.Grow Lab is nearing completion, and five students have undergone the application and interview process and been accepted into the program.
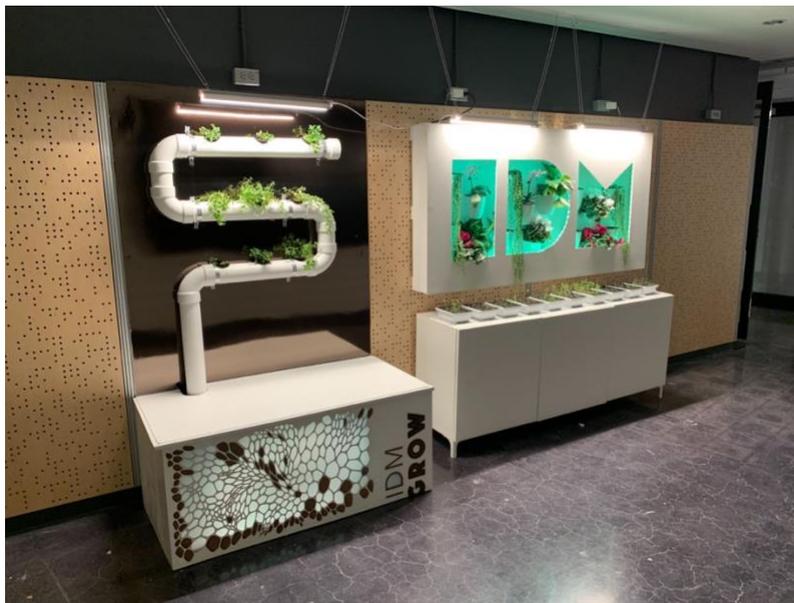
Mission & Objectives (300 words):
What are the measurable goals you want to accomplish and the changes you aim to make with this project?

The mission of IDM.Grow is to not only enable students to acquire real experience working in the AgTech field, but to develop relationships with community organizations experiencing existing challenges related to agriculture and food access. By connecting design and engineering students to these groups, we aim to meet some of the core tenants of the Green Grant program: *foster environmental literary and community engagement, advance applied research and design, expand sustainability learning opportunities, and demonstrate the viability of best practices and technologies for sustainability*.

Our primary, measurable goal is to increase awareness and practice of sustainability and agricultural design within the IDM community. While students within IDM have shown a strong

interest in the sustainability field, there are very few courses which specifically address the challenges, existing solutions, and opportunities for design in this area -- the "Developing Technologies for Urban Gardens" course by Vanessa Harden in Fall 2019 being the exception and proof of interest. Through IDM.Grow and its physical presence in the form of the hydroponic garden at the entrance to the IDM department ("IDM.Grow Lab"), we will promote both sustainability/AgTech design and the IDM.Grow program right at the heart of IDM. We hope to see an increase in student work in these areas (in our program *as well as in other IDM offerings*) as well as additional course offerings on sustainable, environmental, and/or agricultural design in the IDM department.

In addition, each student's project will have its own measurable objective. As part of their design process, students must identify a baseline measurement or status for the issue they aim to address, and then demonstrate change as a result of their implemented designs at the end of their project.

Methodology (500 words):
What's your game plan? How will you conduct your project from start to finish?

The program will operate between two main sites. The Urban Food Lab located in the MakerSpace will serve as a testing space for a selection of projects. The second site is the IDM.Grow Lab (currently being built), located at the entrance to the Integrated Digital Media department at 370 Jay Street. This space is a physical manifestation of the overall program, offering students, faculty and visitors an opportunity to learn about AgTech through the vertical hydroponic garden, germination station, and interactive display. The Grow Lab is the first and currently only garden or green space in the department. Yield from the garden and germination station will be shared with the department and local partners, while flowers grown on site can be placed around the third floor to help decorate and invigorate the space. In addition to promoting the program, the IDM.Grow Lab also offers proven health benefits through air purification and overall increase in mental wellness.

While currently underway, the IDM.Grow Lab requires certain elements to be completed in order to ensure that it performs and communicates as it was intended. With a soon-to-be-completed promotional video and website, we have allocated funds for a digital screen to be hang within the IDM.Grow Lab space in order to help promote the goals of the program and educate students, faculty and visitors to the department. We have allocated funds for hydroponic equipment such as grow lights, monitoring devices and testing solutions. A budget has also been put towards plants, seeds, soil as well as funds for maintenance and ongoing upkeep of the grow lab.

The IDM.Grow program will meet once a week to discuss their research, learn about and maintain the vertical gardens in their experimental spaces (Urban Food Labs and Grow Lab), and share progress on their projects. The course will also feature guest speakers from the community partners and related industries, many of which will be open to the NYU community. After completing initial training conducted by Omar Gowayed, Founder of the NYU Urban Food Lab, students (and additional farmers) will also be required to contribute to the maintenance of the vertical gardens outside of class according to a mutually agreed-upon schedule. The program will communicate primarily through Slack, although students will also be required to document their research and projects on the IDM.Grow blog.

The IDM.Grow program is currently underway. By the end of December, the students were selected by first reviewing resumes and statements of interest in order ensure a multidisciplinary and enthusiastic team. Those applying for the independent study were also asked to write an individual

syllabus (see [Supplement 3, independent study proposals](#)). Students were later interviewed in order to evaluate their problem-solving skills and self-motivation. Five students were selected: three undergraduate students will participate in the VIP program and two graduate students will complete independent studies. In addition, five additional graduate students will participate as "farmers" to learn and help maintain the Urban Food Lab and the Grow Lab. Student areas of interest include: accessibility, automation, education, machine learning, urban ecosystems, and water pollution and usage.

Based on their areas of interest and the challenges posed by partner organizations, students will be paired with an organization. They will be asked to conduct first-hand ethnographic research and interviews with community partners whose challenges are relevant to the student's chosen topic. As much as possible, students will work directly (on-site) with the partner organization.

Based on the findings from their research, students will design prototypes, which may be tested at the Urban Food Lab and/or Grow Lab in IDM. Iterative prototypes will also be user tested with the community partner organization, whose feedback will be integrated into further designs. Depending on the length of the student's project (VIP may last several semesters while independent studies last a single semester), students will create multiple working prototypes of their solutions. At the end of the student's program, students will present their projects to a specifically selected panel (including the partner organization) by explaining their process, demonstrating their prototypes, as well as describing how they see their projects evolving. Students will also prepare a for a showcase where they will have the opportunity to demonstrate and present ideas and concepts to the NYU and local community.

The IDM.Grow project will hopefully not end, per say. After a successful launch of the program and first iteration, we hope the program will continue with new students and with funding from the IDM department.

Benchmarking and Baseline Analysis (300 words):
What other similar work has been carried out addressing the issue you are tackling? Have there been other similar projects to yours within NYU or elsewhere? What metrics of measuring impact etc. were used then? What will be your project baseline to measure the impact you create?

While numerous hydroponic/aquaponic educational programs exist (e.g., Princeton Vertical Farming Project, the Edible Campus Gardens at the University of Utah), one example with whom we will work very closely is NYU's Urban Food Lab. This Vertically Integrated Projects (VIP) Program provides a space for students to learn about and practice sustainable design methods and to design solutions to challenges in the AgTech space. The Urban Food Lab measures two items: the farm's goals and the students' progress. The continued progress of the farm is assessed through measuring the water quality and clarity, the quality and quantity of the yield of both plants, the health of the plants and animals, production of food, and enhancement of farm outreach/platform. Students in the program are evaluated based on their participation, the development of thought within their weekly journals, and their final presentation, the latter of which helps gauge the success of the measurable goals for their individual projects.

The Urban Farm Lab at the NYU Food and Nutrition Studies department is another class that teaches students about urban agriculture and invites their students to harvest from their urban farm. It is less hands on as it focuses less on student projects and more on teaching students about the various system and designs of urban farms. This program also explores similar themes to

IDM.Grow but without proposing or implementing new designs within the space: food justice and sustainable agriculture. Success is also measured through farm yield and student work.

Many programs which connect student engineers and designers to local and global clients to address real-world problems likewise exist at NYU through VIP programs and inter-departmental collaborations. One such program is the Ability Project, which offers project-based courses that explore the intersection off accessibility and technology. In many courses, students work in teams to identify clinical needs relevant to their chosen client and learn the process of developing an idea and following that through to the development of a prototype product. Success is measured through student participation as well as feedback from the client.

IDM.Grow will follow similar methods as the programs described above to measure impact. Success of the Grow Lab will be assessed through measuring the quality and quantity of the plant yield (current baseline is zero, as the Grow Lab is not finished yet). In regards to community outreach and student project success, baselines will vary based on the client and student work. A baseline for IDM student awareness of the Urban Food Lab and similar program was collected by polling students. Of the 31 students questioned, only 6 were aware of the program. This will serve as a useful baseline when measuring the growth of awareness in the IDM community.

Challenges and Assumptions (300 words):
What challenges do you anticipate running into during your project? Are there any risks involved? Are you making any assumptions in your project or research? How will you address them?

We anticipate several challenges while running IDM.Grow and the Grow Lab. We require continual staffing for uninterrupted maintenance of the Grow Lab, including over holidays and vacations. We are working to address this issue by training four additional student "farmers" in addition to the students participating in the VIP program to assist in maintenance coverage. We may also encounter issues with the agricultural operations of the Grow Lab (e.g., plant health, algae blooms). We are working to address this issue by partnering with the Urban Food Lab to learn more about known issues and solutions to hydroponic gardening within NYU. We are also starting with a relatively small growing space to mitigate any issues before growing the space. We may also encounter challenges in communicating and working with international organizations (e.g., interruptions due to monsoons, internet outages).

While there are no financial risks, there is a small risk in failed crops at the Grow Lab, although that would still be a learning experience for students in the program and would provide perhaps an additional issue that could be addressed as a student project. Potential health risks are limited to the student and the specific project they decided to undertake (e.g., research may require the use of machinery or tools, chemicals). To mitigate these risks, extensive farm orientations will be conducted to teach those who will use the Urban Food Lab and the Grow Lab. Training is also offered to students who wish to use the Maker Space to ensure that they have the correct knowledge in order to operate any machinery and/or tools.

We are assuming that those participating in this program will be keen to learn about the cross-section of agriculture and technology as it applies to various cultures, demographics and socio-economic constructs. We are also assuming that issues and challenges posed by our partner organizations can be addressed by student research and design work within a reasonable (18mo) timeframe.

3. MEASUREMENT OF SUSTAINABILITY OUTCOMES

All proposals must include a plan for measuring the success of addressing your chosen sustainability objective. Please consider metrics relating to resource usage, impact reduction, financial costs/savings and contribution to a campus culture of sustainability.

1. What specific problem(s) or issue(s) pertaining to sustainability does your project address? (Please choose a maximum of 3 issues)

Air Pollution	✓	Environmental Justice	
Biodiversity Conservation		Fair Wages	
Climate Change (Global Warming)		Future Generations	
Community Development	✓	Habitat Preservation	
Conservation		Hazardous and Toxic Substances	
Cost-Savings		Land Degradation/ Contamination	
Economic Development		Light/Noise Pollution	
Environmental Health		Ozone Depletion	
Poverty		Public Education	
Resource Depletion		Resource Waste	
Water Pollution		Wellness & Nutrition	✓
Other:			

2. What data is available to explain the relevance of your project to these sustainability problem(s)? (300 words)

While student projects address several problems related to sustainability, the overall program most closely pertains to *air pollution, community development, and wellness & nutrition*.

Air pollution:
The IDM.Grow Lab, in particular, demonstrates the importance of design and technology as related to addressing *indoor air pollution* through indoor gardening. According to a 1989 research publication cited by the EPA[1], plants are a functional solution to reduce indoor air pollution. Wall paint, cleaning solutions, and office equipment such as printers have been named by the EPA as sources of VOC (Volatile Organic Compounds). The concentration of these pollutants can be up to ten times higher indoors compared to the outdoor environment. Prolonged exposure to these high levels can yield symptoms including irritation to the eyes, nose, and throat; headache, dizziness and nausea; damage to liver, kidneys and central nervous system; and possibly raise incidence of some cancers.

Community development:
Several papers have been published in recent years on the impact of "real world" project-based and service-based learning on sustainability programs, notably *community development.* Their findings

[1] United States Environmental Protection Agency, "Volatile Organic Compounds' Impact on Indoor Air Quality." *EPA*. https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality, accessed 21 January 2020.

suggest that real-world learning opportunities are most conducive to introducing students, faculty, and community partners to collaborative research between academic researchers and practitioners [2]. In addition to building skills such as problem solving and collaboration, project- or service-based learning encourages students to remain engaged with the community and with the issue of sustainability. They are more likely to remain engaged with they can see that their participation (and the success of their projects) is effecting change.[3]

Wellness & nutrition:
Both the IDM.Grow Lab (and its hydroponic farm component) and the IDM.Grow program address sustainable *wellness and nutrition*. According to The Food Trust's comprehensive compendium of research in this area, "An overwhelming body of evidence over 20 years indicates that accessing affordable, high-quality, and healthy food is a challenge for many families." Access to healthy foods in various ways – grocery stores, farmer's markets, community gardens – improve physical health as well as economic and community health.[4] Hydroponic gardens such as the IDM.Grow Lab and those of our community partners can help address food security. Hydroponic gardens have been shown to produce a consistently higher yield than traditional gardening techniques using fewer resources and producing less waste.[5]

3. Is there any data available pertaining specifically to NYU that can serve as a baseline for measuring your project's performance? If not, please provide a measurement plan for gauging a baseline as part of your project. (300 words)

Air pollution:
Gianna White, a student in the Urban Farm Labs program, conducted an air quality assessment in the MakerSpace to gauge the effect of the farm of the environment over the course of a week (see [Supplement 4, air quality report](#)). They found that the daily average of VOC levels was consistently lower in the farm than in the MakerSpace; this was also true of particulates and formaldehyde. They also found that the level of pollutants spikes throughout the day. While the average value between the farm and Makerspace is generally close, there are times when the air pollutants reach unhealthy levels in the Makerspace and not in the farm. While the baseline study conducted in the MakerSpace is useful, we must also conduct a similar study at the entrance to the IDM department, where the IDM.Grow Lab is located. It is also important to note that the results from the baseline study in the Makerspace indicate that there should be more vertical farms in our workspaces in order to enhance air quality, hence the importance of expanding and promoting the IDM.Grow Lab.

As in this report, we will measure inhalable particulates (PM2.5), total volatile organic compounds (TVOC), formaldehyde (HCHO), and CO_2 levels over the course of a week *before* the plants are

[2] Brundiers, K., A. Wiek, and C. Redman. 2010. "Real-world learning opportunities in sustainability: From classroom into the real world." International Journal of Sustainability in Higher Education 11 (4): 308–24. doi:10.1108/14676371011077540.

[3] Stenger, M. 2013. "Students Can Benefit from Participation in Community Service Studies Show." *informEd*. https://www.opencolleges.edu.au/informed/other/students-can-benefit-from-participation-in-community-service-studies-show-4147/, accessed 21 January 2020.

[4] PolicyLink, The Food Trust. *Access to Healthy Food and Why It Matters: A Review of the Research*. 2013. http://thefoodtrust.org/uploads/media_items/access-to-healthy-food.original.pdf.

[5] Naik, P. K., B. K. Swain, and N. P. Singh. 2015. "Production and utilisation of hydroponics fodder." Indian Journal of Animal Nutrition 32 (1): 1-9. https://www.researchgate.net/publication/275097452_Review-Production_and_Utilisation_of_Hydroponics_Fodder, accessed 21 January 2020.

installed in the Grow Lab. Because the effect of indoor gardens on air quality is a feature we want to demonstrate and share with the community, the air quality measurements will be reported on the IDM.Grow website and interactive display.

Community development:
Vanessa has been working and engaging with the partner organizations between two and four years through primarily through her Subversive Gardener organization, even working with Green Souls on-site in Mumbai, India. The organizations are all actively working on agricultural solutions and have demonstrated need for a collaboration with NYU's student expertise. A relationship between NYU's sustainability efforts and our community partners already exists, as the final projects from the pilot course in Fall 2019 paired students with many of the same community partners as this program. However, the final projects resulting from this class were primarily theoretical due to time constraints and resources; only six of the thirteen designs are currently being investigated for implementation by the partner, and one is being actively implanted as a result of the pilot course (see Supplement 6, Community Partner Rubric for Green Souls). We aim to expand this metric to 100% implemented solutions.

Wellness & nutrition:
While measures of success are readily available for the aquaponic system at the Urban Food Labs, the IDM.Grow Lab is a separate entity which is still under construction. Therefore, there is no baseline available for use in measuring the yield from the Grow Lab as a success metric.

For students who will work directly with issues pertaining to wellness and nutrition, students must measure (or collect a report of) the current state of affairs regarding farm yield, food served, etc. This will serve as a baseline against which to measure the success of their individual projects.

4. What metrics will you use to measure the performance, impact and success of your project? [Please provide a detailed breakdown] (300 words)

Air pollution measurements throughout the semester will help demonstrate a positive impact of the Grow Lab on air quality in the IDM entrance. Our methods will mirror those conducted in the Urban Food Labs space (see Supplement 4, air quality report).

Much of the success of the program will be measured through student and partner organization evaluations. Students will be evaluated based on their participation, the development of thought within their weekly check-ups, and their final presentation. The final presentations for the students will help gauge their individual successes for each of their projects.

A major component of the success metrics will be an evaluation of the IDM.Grow program conducted by the partner organizations at the end of the initial program. The organizations will be given a rubric (see Supplement 5, Community Partner Rubric) to evaluate the students' communication skills, ability to adapt to the organization's needs, and collaboration skills, as well as the students' final design and product or service. It is our hope that these rubrics will help evaluate how well the students are able to meet the needs of the organization through their work as well as build a relationship with that community.

The success of student projects will also be measured against their individual, measurable goals. In most cases, these metrics have not yet been identified because the students have not yet identified the problems posed by their partner organization.

4. PROJECT TEAM

Describe your project team by entering your responses in the right column of this table. If you have multiple team members, please copy and paste a table for each additional team member.

Team Member Type *Project Leader or Team Member*	Project Leader
Contact Info	Vanessa Harden Email: vanessa.harden@nyu.edu Phone: (718) 200-4755
NYU Affiliation *If your affiliation is "student," please also tell us your degree program (undergraduate, medical, non-degree, etc.)*	Adjunct Professor, Integrated Digital Media, Tandon School of Engineering
Role(s) within project *If applying as the sole project leader with no team members, you may leave this section blank*	
Experience and Qualifications Relevant to Project	Vanessa Harden (MA RCA) is an Adjunct Professor in the Integrated Digital Media program at Tandon with experience teaching courses at the intersection of sustainability, agriculture, technology, and design, including the graduate course, "Developing Technologies for Urban Gardens" this past fall. This course involved the design and execution of a new indoor hydroponic garden (the IDM Grow Lab) situated at the entrance of the IDM department, as well as student-led design proposals for clients with urban gardening challenges in Brooklyn, Mumbai, and Ghana. Vanessa is also the founder of Subversive Gardener, a non-profit organization for environmental education, design exploration and public intervention connected to the guerrilla gardening subculture. Vanessa brings her extensive design experience in agricultural technology and beyond, as well as her existing community partners both local and international to this project. In her collaborative, inclusive design practice, she uses a socially responsible, impact-led approach to design to create interactive

	installations. In both her professional practice and her teaching, she engage students in an iterative design process that challenges them to combine art, design and technology in new ways.
Integration with other responsibilities *Explain how you this project will integrate with your student and/or professional schedule.*	As an adjunct professor at NYU, Vanessa is teaching one course that meets twice a week at NYU. She will be on campus working on the class as well as the IDM.Grow program. IDM.Grow will meet once a week during one of the days she is on campus. It is an extension of something that is already being worked on, and the existing infrastructure with her Subversive Gardener work enables a seamless integration with her current responsibilities.

5. PROJECTED TIMELINE

Use the following table to set forth a timeline for your project, keeping in mind that you will be asked to submit measurements regarding the performance of your project in your mid-term report. Green Grants projects must be completed within two semesters of launching.

Please add as many rows as you require and be as detailed as possible.

Date (Month & Year)	Task
January 2020	Select and Interview Students
January 2020	Start class
February 2020	Students begin individual projects
February 2020	Launch Meeting – Sign Grant Contract
March 20120	Write Mid-Term Report
May 2020	Students Present their semester's work
May 2020	Submit Mid-Term Blog Post
May 2020	Proposals due
May 2020	Start class
June 2020	Students begin/continue individual projects
July 2020	Write Mid-Term Report

August 2020	Students Present their semester's work
September 2020	Proposals Due
September 2020	Fall semester begins
October 2020	Students begin/continue individual projects
November 2020	IDM.Grow Project Expo in IDM
December 2020	Poster Presentations/ Final Exam
January 2021	Project Completed
January 2021	Final Report Due

6. BUDGET

Please create a line-item budget for your project. Line-items should be specific. For example, instead of listing "Event-$400," the breakdown should look like "Catering-$100, Space Rental- $200, Speaker Honorarium-$100."

Use prices from Staples for office supplies, NYU Bookstores for books and NYU Computer Store or B&H Pro Photo, Video & Audio for technology whenever possible. For all other items, first draw upon NYU's list of approved vendors; if you need goods not offered by these options, determine an appropriate vendors and list their prices here. Refer to our Green Grants Guidelines for a complete list of funding rules and restrictions.

Please note that student payment for hourly work performed on a Green Grant must include a 30% fringe benefit as per University policy. This 30% is added on top of the total compensation (hourly rate * # hours * # weeks). Example of fringe calculation: A student will be paid $18/hour for 5 hours each week over 6 weeks. $18 * 5 hours * 6 weeks = $540. $540 * 30% = $162. $540 + $162 = $702 = total student budget.

Please refer to our Google Sheet link for our budget:

Total Project Cost: $17,025.90

7. ENVIRONMENTAL IMPACT STATEMENT

The Office of Sustainability aims to remain socially and environmentally responsible in the funding of Green Grants projects. Grantees are expected to mindfully plan their projects to minimize their projects' environmental impacts by:

- **Consolidating purchases of materials and choosing eco-friendly options wherever possible**
- **Minimizing trips taken by cars and planes and opting for public transportation**
- **Minimizing the creation of waste and properly disposing of all recyclables, landfill-bound waste, and hazardous materials**
- **Monitoring their usage of utilities, including gas, electricity and water.**

Please use this space to roughly assess your project's environmental impact and what measures you'll be taking to minimize it. You must include a waste plan and the product life-cycle of anything created under the grant. A sample environmental impact statement can be found [here](). (300 words)

We will consolidate the purchase of materials and choose eco-friendly options wherever possible; we will take the following specific measures:

- All new seeds are and will continue to be purchased through Baker Creek Heirloom Seeds, which provides non-GMO, heritage plant seeds. In this way, we will promote the legacy of permaculture and sustainable (not mono-) agricultural practices.
- Seeds from existing plants will be harvested and used to limit the impact of ordered and shipped goods.
- Additional hardware and tools will be purchased locally as much as possible to also minimize the effect of transport, packaging, and shipping.

We will monitor our usage of utilities, including gas, electricity and water, by taking the following steps:

- Energy saving utilities such as energy efficient LED light bulbs will be used throughout the program prototypes as much as possible, including the lights used in the IDM.Grow Lab.
- In addition to being a highly energy-saving method of gardening, the hydroponic system in the IDM.Grow Lab uses timers prevent the unnecessary waste of electrical energy.

We will minimizing the number of trips taken by cars and planes and opting for public transportation, in particular:
- All local travel conducted for the program (e.g., visiting sites) will use public transportation as much as possible; if cars are necessary to transport large prototypes, carpooling will be used.

We will minimize the creation of waste and properly disposing of all recyclables, landfill-bound waste, and hazardous materials, in particular:
- Organic waste such as dead plants that result from our program will be composted
- Nutrient-rich water waste from the hydroponic system will be recycled by feeding plants outside of the system.

- Students must dispose of any waste from their prototypes by following the guidelines illustrated on the NYU Environmental Health and Safety website for proper waste removal for potentially hazardous materials.
- Students must provide instructions for recycling, reusing, or otherwise properly disposing of their prototypes to the clients

8. INTEGRATION

List all internal (NYU departments, offices, etc.) and external (government agencies, partner institutions, businesses, NGOs, etc.) individuals and organizations that you intend on collaborating with. If you are working on a project that takes place on an NYU Campus, you must obtain and attach statements of approval or support from collaborators. For example, if your project is to install sensors on recycling bins in residence halls, you will need a statement of approval from the Office of Residential Life and Housing Services. Supplemental letters of approval from external partners are highly encouraged, but not necessary.

Initial IDM.Grow cohort:

VIP (undergraduate students)

- Simon Bayona
- Joel Cabrera
- Thomas Knoepffler

Independent Study (graduate students)

- Myra Khan
- Andrew Lau

Farmers (graduate students)

- Lily Chen
- Caitlin Gebhard
- Tamanda Msosa
- Sarah Nejad
- Grant Ng

NYU organizations and individuals:

Advisors and primary contacts

- Scott Fitzgerald
  - *Industry Associate Professor, Co-Director IDM, Tandon School of Engineering*

- Omar Gowayed
  - *PhD candidate, Project Lead for Urban Food Labs VIP program*

External organizations and individuals:

Advisors and primary contacts

- Maia Bromley-Dulfano
  - *Subversive Gardener (Brooklyn, NY)*

Community Partners

- Southside United HDFC "Los Sures" (Brooklyn, NY)
- Scholes Street Children Garden (Brooklyn, NY)
- Ndor Eco Village (Volta Region, Ghana)
- Green Souls (Mumbai, India)

9. INSTITUTIONALIZATION

1. **What future project phases can you envision after the Green Grant term? (300 words)**

   We would like to encourage students in the IDM.Grow program to submit papers and presentations on their work to journals and conferences and connect with other students and professionals in the AgTech and sustainable design space.

   Eventually, we would like to acquire space to develop an outdoor Grow Lab, which would be an additional testing space for projects. This space would more closely mirror the conditions at several of our partner organization's grow sites, and it would provide additional space for an expanded program as well as space to practice, experiment with, and promote sustainable farming techniques.

   We also envision a partnership with additional organizations, such as composters, who can serve as test beds for solvable problems as well as expertise. In the case of composting, we would like to partner with a composting organization to both use and contribute to their compost.

2. **How would the project be able to sustain itself (in terms of funds, staff time, etc.) beyond the Green Grant term? Are you currently applying for or have you secured any additional funding? (300 words)**

   We aim to make IDM.Grow a permanent program offering within the IDM department and a legacy within the NYU community. This long-term vision involves funding from IDM, who have already funded the initial phases of the IDM.Grow Lab and have been a great supported of the new initiative's new courses and program.

   Future staffing will be addressed through a mentorship program. The five graduate farmers in this semester's cohort will be responsible for teaching the "next generation" of farmers through creating a "living," collaborative User Guide for the IDM.Grow Lab and Urban Food Lab as well conducting show-and-tell events for recruitment. This practice will continue to evolve each semester as the program and the Labs evolve.

3. **How might successful completion of this project present new opportunity for sustainability at New York University? Could it be scaled up in the future? Will it answer a question or solve a problem that benefits others at NYU? (300 words)**

   The success of this program will forge the way for continued research and design into the field of impact driven environmental design - a field that is becoming increasingly more important in the face of climate change and its associated challenges. The success of the program will ultimately be due to the mutually beneficial relationships that have led to the design and implementation of empathetic solutions to agricultural challenges. A successful launch of the IDM.Grow program and Grow Lab would ensure that students have an opportunity to apply their studies to real-world issues and to continue exploring the intersections of design, technology, and sustainability through service-project-based learning. It is our hope that sustainability and sustainable design will become a primary learning objective within IDM. As a model, we see a program that involves students with their community a necessary element to designing bespoke solutions to unique challenges.

This program will also offer others at NYU the opportunity to engage with the field of AgTech and impact driven design by applying for this program.

IDM.Grow can be scaled up in the future through expansion of people and resources. The number of admitted students can be increased, as well as the number of partner organizations and NYU staff. In the future, it would also be beneficial to include more cross-departmental collaboration. This growth would require an expansion of resources and space. The Grow Lab within IDM could be expanded to include a larger and/or more extensive hydroponic garden and germination station. It may also serve as a model for more indoor hydroponic systems within NYU.

4. **If your projects does not benefit New York University, please further explain its ongoing impact. Who will the project be benefitting? Does it address any social, economic, or equity issues? (300 words)**

This program is based on a foundation of design for positive impact in practical, concrete ways; student projects will not be speculative or theoretical, but implementable.

In addition to benefiting students at NYU, IDM.Grow will benefit the client organizations with which the students work. Several of the organizations with which we are partnering face social, economic, and equity issues. As Priti of Green Souls in Mumbai explained in her brief to the students in the pilot course this past fall, "Turning urban farming into a sufficient revenue making model is difficult also it walks the tightrope of succumbing to the corporate trend of scaling things up via unjust process of production." For her organization as well as many of our partners, expanding the impact of their urban farming/sustainability efforts is hindered by their financial struggles. Likewise for other community partners, these sustainability efforts are being made for individuals who face social, economic, or equity issues on their own; for Green Souls, it is schools for disabled and/or orphaned children. For Southside United HDFC, their hydroponic gardens contribute some fresh food to their food pantries.

Students in IDM.Grow will be challenged to address agricultural and sustainability issues for clients who do not have the resources to implement many known "high tech" solutions. Not only will this give students deeper insight into the myriad social issues affecting sustainability, but their projects will have a profound impact on people who need it most. The creative solutions that students design and help to implement should enable these organizations to continue expanding. It is our hope that the solutions that come out of IDM.Grow will enable these organizations provide education, food access, and growth for their own communities.

SUBMISSION & ATTACHMENTS

Supplementary files are available on Google Drive

1) Letters of Support
   a) Urban Food Lab
   b) IDM
   c) Ndor Eco Village
   d) Los Sures
   e) Green Souls
2) Example final presentations from "Developing Technologies for Urban Gardens" (Fall 2019)
3) IDM.Grow independent study project proposals (Spring 2020)
4) Air Quality Report from Urban Food Lab
5) Community Partner Rubric template
6) Community Partner Rubric from Fall 2019 pilot course for Green Souls

When you're ready to submit this proposal, email it to **green.grants@nyu.edu** along with any supplementary documents (such as schematics, prototypes, and mockups).

Please remember that student project leaders are required to submit a resume or letter of reference that demonstrates their diligence, responsibility, and ability to carry out an unsupervised, year-long project. Staff and faculty project leaders are welcome, but not required, to submit letters of support or reference.

All applicants should also provide letters of support whenever third party approvals are vital to the manifestation of their proposed projects.

FOR PROJECTS BASED ON A CAMPUS SITE OTHER THAN NEW YORK CITY, access to funding is dependent on administering of funds to the campus site your project is based in. This will require a point of contact who is able to track your spending, and it is your responsibility to seek an administrative aide to assist you in this process. Please list this contact's name, email, and job title here.