AGENDA

College Senate Meeting

May 13, 2009
Room E-500
2:15 p.m.

I. Approval of Minutes --- April 22, 2009

II. Report from the Chairperson

III. 2009-2010 Senate Meeting Calendar

IV. Curriculum Committee Report

Letter of Intent: Multidisciplinary Associate in Engineering Science (A.S) Program in Environmental Engineering and Earth System Option (EEES) – Department of Mathematics, Engineering & Computer Science
New Course Proposal – Department of Natural & Applied Sciences
SCC205, Introduction to Chemistry
Presented by Dr. Cecilia Macheski, Chairperson of the Curriculum Committee

V. Academic Standing Committee Report

- **Resolution on Non-Matriculated Students**

Presented by Dr. Sandra Hanson, Chairperson of the Academic Standing Committee

VI. Stipend/Compensation For Student Senators

VII. Student Judicial Process

Presented by Senator Robert Kahn

VIII. Old Business

IX. New Business

X. Adjournment

Light Refreshments will be served.

The City University of New York
LaGuardia Community College
Mathematics, Engineering, and Computer Science Department

Multidisciplinary Engineering Science Associate Degree

Environmental Engineering and Earth System Option

(EEES)

Prepared by

Dr. Yasser Hassebo
Dr. Zahidur Rahman

Departmental Curriculum Committee Approval Date: 3/25/09

College-Wide Curriculum Committee Approval Date: 4/23/09

College Senate Approval Date: _____
Chancellor's Report:

TABLE OF CONTENCTS

1. RATIONALE AND JUSTIFICATION

The Department of Mathematics, Engineering and Computer Science (MEC) at LaGuardia Community College of the City University of New York (LaGCC-CCNY) proposes to create a program option in Environmental Engineering and Earth Systems (EEES). The proposed Environmental Engineering and Earth Systems option will be offered under sponsorship of the Academic Affairs Division. The proposed curriculum (sixty credits) draws primarily from existing courses in the Engineering Science program housed within the MEC Department, and will enable students to develop a well-rounded understanding of environmental issues. The proposed undergraduate option in Environmental Engineering and Earth Systems is designed to prepare students to transfer into Environmental Engineering and Earth Systems programs at four-year institutions. The proposed option also provides students with a deep foundation in the discipline, which will be achieved by allowing for an expandable range of electives that tailor the program to multiple specialized tracks (remote sensing, water resources, atmospheric engineering, etc.). Specialization may be initiated at La Guardia by taking advantage of electives currently available, and continued after transfer to four-year CUNY colleges or elsewhere.

In the coming decades, environmental issues such as climate change, global warming, emission control, resource management, public health, and clean-up of toxic pollution sites will take center stage, driving scientific and engineering research into complex inter-disciplinary areas. Environmental stress will be particularly acute in urban ecosystems that have come to accommodate the bulk of the Earth's expanding population. Furthermore, concerns of security add new urgency to urban environmental issues. In the new century, sustainable development will also depend critically on engineering and science advances that will synergize finite human resources and global ecology.

To be able to produce accurate and timely studies that will allow lawmakers to formulate sound environmental policies, federal agencies—notably EPA, NASA, NSF and NOAA (National Oceanic and Atmospheric Association)—have already planned for major new multi-disciplinary initiatives. As a direct consequence, there has been rapid expansion in the "environmental" industry ranging from small consulting firms to large companies (e.g. Raytheon, Northrop-Grumman, etc.). This is also reflected in the National Academy of Engineering's Engineering and Environment program and its projects, Earth Systems Engineering in particular.

Effective solutions to environmental problems will require a cross-disciplinary array of engineering and scientific skills. Traditionally, Environmental Engineering has been a sub-program of either Civil Engineering or Environmental Science. However, the focus of CE programs is chiefly municipal, and many Environmental Science programs have tended to be narrowly focused on theory. More recently, a number of institutions (such as Columbia, UC Berkeley, U. of Colorado, U. of Wisconsin, U. of Michigan) have developed multidisciplinary Environmental Engineering programs with a regional/global focus. Such programs are flexible, providing a rigorous general training, while allowing a wide array of specializations. For example, The City College of the City University of New York has received major funding (over

$20M in grants) in this area of environmental engineering/science during the past seven years, culminating in two national centers: the Cooperative Center for Remote Sensing Science and Technology (NOAA CREST), and the Center for Optical Sensing and Imaging (NASA COSI). Research groups working in these centers come from various engineering and basic science departments including Electrical Engineering, Civil Engineering, Earth and Atmospheric Science, Computer Science, Physics, and Chemistry.

2. NEED

LaGuardia Community College will have the opportunity to train and graduate students with an associate degree in science; they will then be able to obtain employment as environmental engineering technicians or to transfer to senior colleges in order to pursue careers as scientists and engineers, thus fulfilling the increased demand for experts in this field. Both two- and four-year graduates will be in the vanguard of the still nascent green revolution. In particular, they will bring much-needed knowledge and skills to bear on the modification and testing of devices used in the detection, prevention, control, and remediation of environmental pollution (water and air). As mentioned above, federal agencies and private sector industries have launched major initiatives in environmental areas. Thus, an option in environmental engineering, in LaGuardia CC, would prepare our students for a growing number of careers. Environmental engineering majors, whether they have gone into that particular field—or some other related field—upon graduation consistently cite courses in the principles of environmental engineering, environmental regulations, operating equipment and optics, and scientific data analysis as beneficial to their ultimate career choices.

According to the U.S. Department of Labor, in 2006 engineering technicians (holding an associate degree) held about 511,000 jobs. 21,000 of them were environmental engineering technicians. Overall employment of engineering technicians is expected to increase by about 7% which is comparable to the average growth rate for all occupations. This projected growth and more specific job prospects vary by specialty. Opportunities will be best for individuals with an associate degree and/or extensive job training in engineering technology. Moreover, opportunities for environmental engineering technicians are expected to grow to 25% between 2006 and 2016, much faster than the average for all engineering technicians (U.S. Bureau of Labor Statistics, 2007).

In 2006, environmental engineers held about 54,000 out of a total of 1.5 engineering jobs. It is projected that employment for environmental engineers will grow fastest (much faster than the average) during the next decade despite the economic conditions which will likely affect other engineering majors. A similar increase of 25% or more in employment opportunities for environmental engineers through 2016 is anticipated, because more environmental engineers will be needed supervise compliance with environmental regulations and to develop and modify new techniques to ameliorate the global climate change crisis and to treat existing exposures to pollution (U.S. Bureau of Labor Statistics, 2007).

For many, the A.S. in environmental engineering is a sure route to a well paying job. Others carry over this degree to senior colleges, where better jobs await on graduation. Earnings for engineering technicians and engineers vary significantly by specialty, industry, and

education. According to the U.S. Bureau of Labor Statistics in May 2006, an environmental engineer's salary varied between $54,150 and $106,230. For technicians, the median annual salary was about $40,560.

Examples of Career Opportunities (after graduating from a four-year college)

- Remote Sensing Instrumentation Engineer: design, develop and test remote sensing instrumentation such as imagers, sounders, radiometers, and fluorometers for a variety of platforms from ground-based to aircraft, and to satellites

- Remote Sensing and Geospatial Analyst: development of software analysis tools to process data from various instruments and other information sources, geospatial data visualization, layering of geo-referenced data from instruments and other supplemental data, GIS data analysis, development of products positively affecting water quality, air quality, meteorology (winds, precipitation, etc.), soil moisture, and agricultural diversity

- Instrumentation Engineer: development of sensors for surface measurements including air and water samplers, optical sensors, and chemical sensors

- Environmental Scientist/Engineer

  - Watershed protection and water quality (pollution) monitoring, coastal zone protection, wetland monitoring and conservation

  - Air resources and pollution control, emission testing, pollution transport, indoor air quality, atmospheric chemistry

  - Urbanization and population impact, land use/land cover, forestry, agriculture (crop health monitoring), resource management

- Climate and weather scientist, geophysicist/geochemist, and planetary scientist

- Reconnaissance Officer

Examples of Prospective Employers

- **Industry (National and Regional):** Raytheon, Lockheed Martin, Northrop Grumman, ITT Industries, Thermo, Aerodyne, ASD, Wetlabs, YESInc., TRC Environmental Corp., ALC Environmental, ARCADIS

- **Local Governmental**: New York City Department of Environmental Protection, New York State Department of Environmental Conservation

- **Federal Agencies**: NASA, NOAA, DOD, DOE, USGS, US EPA, Forest Service

3. SUPPORT

The Department of Mathematics, Engineering and Computer Science (MEC) of LaGuardia Community College has the necessary environmental engineering and earth systems faculty to support this option. Currently the department has two full time environmental engineering/earth systems faculty members—Drs. Yasser Hassebo and MD Zahidur Rahman—with specialties in environmental engineering techniques, including remote sensing, LIDAR systems, satellites, and atmospheric engineering. A substantial record of publications and demonstrated hands-on experience supports their research capabilities. Therefore, the new option is well positioned to support the needs of our students and to fulfill the curriculum requirements.

Dr. Hassebo has already established a collaborative research project between LaGuardia and the NASA-COSI/ NOAA-CREST centers at CUNY. This partnership along with the remote sensing equipment from NASA-GISS that he obtained, installed and operates at the LaGuardia site will have a major impact on the proposed option. Consequently, a bridge is in place for our students leading to future opportunities beyond LaGuardia.

The option also takes advantage of the academic strength of LaGuardia's flagship program in Engineering Science in constructing a multidisciplinary curriculum. The proposed program will be linked to and become a part of a handful of national program with a similar framework, and with a unique focus on urban issues and problems. It gives LaGuardia Community College the opportunity to lead the way in this area among community colleges, entering the arena at the right time and the right place (New York City metropolitan area).

4. STUDENTS

Evidence for student interest in this area is provided by a students survey collected during the academic years 2007/2008 and 2008/2009. Also significant is the above-mentioned partnership—undergraduate research and academic pipeline—between LaGuardia and NOAA-CREST/NASA-COSI at CCNY. Under the aegis of this program, more than 20 students were engaged in environmental research during the summer of 2008. One LaGuardia student, for the first time in LaGuardia history, was accepted to the Environmental Engineering program at CCNY with a full scholarship. Additionally, five students from neighboring Queens high schools were granted summer internships in environmental engineering.

It is envisioned that for the next five years, entering classes will be small (10 or less). Students will be directly recruited from New York City High Schools. NASA, NOAA, and other program partners will aid in the recruitment effort. There are also a number of environmental science related programs at the high schools that will contribute interested students to the recruitment pool. Efforts will be made to raise fellowship support for as many students as possible. All students will be assigned to mentors and participate in research activities during the academic year on a part-time basis. The program will actively seek to place students in summer internships at LaGuardia, CCNY, NASA, NOAA and participating industrial partners. Below is a conservative estimate of combined full time enrollment in the AS track.

	Year I	Year II	Year III	Year IV	Year V
Projected Enrollment	10	20	30	40	40

Options for BS Undergraduate Study
The following are among options open to students who wish to pursue an advanced degree in environmental engineering or any other engineering fields

BS at CCNY:

1. BS- Environmental Engineering Track in the Electrical Engineering (EE) department
2. BS- Environmental Engineering Track in the Civil Engineering (CE) department
3. BS- Earth and Atmospheric Science Department
4. BS- Department of Chemistry

Options for Graduate Study
The following are among options open to students who wish to continue their education beyond the BS

MS at CCNY:

1. ME- Environmental Engineering Track in the Electrical Engineering department
2. ME- Environmental Engineering Track in the Civil Engineering department
3. MS- Earth and Atmospheric Science Department
4. MS- Department of Chemistry

PhD at CUNY

1. PhD- Environmental Engineering Program
2. PhD- Earth and Environmental Science Program
3. PhD- Computer Science
4. PhD- Engineering Program (EE, CE)

5. CURRICULUM

The proposed curriculum is designed around existing curricula in the Engineering Science program. Implementation requires only the development of four additional courses totaling 14 credits:

1. Introduction to Earth Systems Engineering and Science (MAE 106), an introductory level course intended for students entering the program.
2. Environmental Engineering and Earth Systems (MAE 217), a second year course analyzing and modeling the large-scale cycles and systems in the environment including plate tectonics and climate change.
3. Environmental Engineering Data Analysis (MAE 264), a second year course on analyzing and interpreting environmental engineering data. (OR)
4. Environmental Remote Sensing (MAE 290), a second year course on the techniques of observing the earth from air- and space-borne platforms/vehicles.

The driving concept behind the design of this curriculum is to provide students with a rigorous yet flexible program. At the same time, the program seeks to integrate existing courses at LaGuardia into a coherent course of study. In view of the multidisciplinary nature of the program and in keeping with the concept of providing a flexible framework for the students to develop diverse specializations, the program has a number of choices and electives (see below). In order to ensure that students develop a coherent plan of study, every student will be required to prepare a program of study at the beginning of their second year together with their assigned faculty advisor. The faculty advisor will submit the completed program to the Environmental Engineering and Earth Systems Coordinating Committee (see administrative structure below) for approval. A student will be able to make changes in the program, but any future changes in the program will require the same approval procedure. The approved program will be submitted to the office of the undergraduate Associate Dean to be used as blueprint for the student's graduation requirements.

Since the environmental issues have clear social, economic, and policy dimensions, a suggested list of relevant social science electives is presented in the electives list. The program will also allow students to take advantage of offerings in related areas at other CUNY institutions (CCNY, Hunter, Queens, etc.). As the program grows, development of other specialized core or elective courses may be appropriate. Such curriculum development will then be undertaken where it is deemed necessary.

5. 1 CURRICULUM FOR EEES (AS DEGREE)

COURSE REQUIREMENTS AT LAGUARDIA COMMUNITY COLLEGE	
Course & Title	**Credits**
General Education (Liberal Arts, Math, Science, Distribution) Courses:	
FSM 024 New Student Seminar/Engineering	0
HUP 108: Environmental Ethics	3
SSN 187: Urban Sociology	3
ENG101: Composition I	3
ENG 210: Journalism or ENG 256: Humor in Literature	3
SCC201: Chemistry 1(3L, 1R, 2Lb)	4
SCC202: Chemistry 2(3L, 1R, 2Lb)	4
SCP231: General Physics	4
SCP232: General Physics 2	4
MAT201: Calculus 1	4
MAT202: Calculus 2	4
MAT203: Calculus 3	4
**MAT210: Linear Algebra	3
SUBTOTAL: 43	
Specific Program Requirements (including Prerequisites):	
COOP Prep for Engineering Science	0
MAE 101: Engineering Lab. 1/Internship I	1
MAE 103: Engineering Lab. 2/Internship II	2
***MAC 125: C/C++ Programming	3
MAE 106: Introduction to Earth Systems Engineering and Science	4
MAE 217: Environmental Engineering and Earth Systems	4
MAE 264: Environmental Engineering Data Analysis OR	
+ MAE 290: Environmental Remote Sensing (elective)	3
SUBTOTAL: 17	
TOTAL: 60	

** To satisfy CCNY 39200 the student must pass LaGCC MAT203 & 210 with a C min.

*** Students that do not complete the two-year program must pass both MAT201 and MAC125 to satisfy Csc 10200 at CCNY.

(#) The number of credits that transfer to CCNY and fulfills a requirement for the bachelor's of engineering degree.

+ Elective to replace MAE 264

Two-Year Course Plan

YEAR I					
FALL I	**MAT201** Calculus I Pre: MAT200 4 Cr. FSM 024 New Student Seminar /Engineering 0Cr	**SCC201** Chemistry I Pre: CSE099, ENA/ENG099, MAT/MAB096 4 Cr.	**HUP108** Environmental Ethics 3 Cr.	**ENG101** English Comp. I Pre: CSE095, ENA/ENG099 Pre/Co: CSE099 3 Cr.	**CPP024** COOP Prep for Engineering Science 0 Cr.
FALL II	**MAC125** C/C++ Programming Pre: MAT201 3 Cr.	**ENG106** Critical Writing Pre: ENG101 3 Cr.			
SPRING I	**MAE101** Engineering Lab I Internship I Pre: MAT200 1 Cr.	**MAT202** Calculus II Pre: MAT201 4 Cr.	**SCC202** Chemistry II Pre: SCC201 4 Cr.	**SCP231** General Physics I Pre: CSE099, ENA/ENG099 MAT201 4 Cr.	**MAE 106** Intro to Earth Sys Engr & Sc Pre/co: MAT200 SCC 201 4 Cr
SPRING II					

YEAR II					
FALL I	**MAT203** Calculus III Pre: MAT202 4 Cr.	**MAE103** Engineering Lab II Internship II / Matlab Pre: MAE101 2 Cr.	**SCP232** General Physics II Pre: MAT202, SCP231 4 Cr.	**MAT210** Linear Algebra Pre: MAT201 3 Cr.	**MAE 217** Enviro Engr & Earth Sys Pre: MAE106 4 Cr
FALL II					
SPRING I	**SSN187** Urban Sociology Pre: 3 Cr	**MAE 264** Env Engr Data Analysis Pre: MAT203 MAC125 3 Cr Or **MAE 290** Enviro Remote Sensing Pre: MAT203 MAC125 MAE 103 SCP232 3 Cr			

Passing Grade Requirement: All courses require a minimum passing grade of C.

5. 2 OPTION CURRICULUM

MAE106: Introduction to Earth Systems Engineering and Science
This course will present a systematic global view of the features, processes, and underlying basic science of the earth, atmosphere, and oceans, emphasizing environmental applications.). Topics covered include system science, global perspectives on earth's complex evolutionary systems, global warming, toxic volcanic hazards and groundwater remediation. In the laboratory, students are introduced to modeling, remote sensing technology, earth materials, and environmental tools used by earth scientists. [3 lectures, 3 lab hours /wk.; 4 credits]

MAE217: Environmental Engineering and Earth Systems
Analysis and modeling of the earth's large-scale cycles and systems including plate tectonics and climate change, with reference to the underlying physical, chemical and biological principles. Physical and chemical properties of earth materials are examined. Software such as EXCEL, Visual Basic and PowerPoint are all used extensively. [3 lectures, 2 lab hour/wk; 4 credits]

MAE264: Environmental Engineering Data Analysis
The course introduces the basic notions and methods of probability theory, statistics and decision through their application to environmental engineering problems. Emphasis is placed on probabilistic modeling and analysis of environmental engineering problems, Bayesian statistics, risk analysis, and decision under uncertainty. This course provides a solid base in applied probability and Bayesian statistics as used by environmental engineers, and introduces students to the increasingly important topic of risk analysis. The course also presents formulation and solution of engineering type probabilistic problems through computer based methods, including developing computer codes using commercial software such as MATLAB and Microsoft Excel. [3 lectures, 1 lab hour/wk; 3 credits]

MAE290: Environmental Remote Sensing (elective)
Remote sensing permits study of the earth's surface and atmosphere (or those of other planets) from a distance, and in particular allows for observation of large regions more easily than on the ground. This course is an introduction to the techniques of observing the earth using air- and space-borne instruments. Basic issues of geometry and scale associated with making these measurements, electromagnetic properties of the earth's surface materials, the range of instruments used to observe the earth and applications of satellite remote sensing to geological and environmental questions will be covered. [3 lectures, 1 lab hour/wk; 3 credits]

Engineering Science: Environmental Engineering and Earth Systems (EEES) Curriculum: AS Degree (Option)

Electrical Engineering Curriculum: AS Degree		**Environmental Engineering and Earth System (EEES) Curriculum: Option**	
Counseling		**Counseling**	
New Student Seminar/Engineering	0	New Student Seminar/Engineering	0
English: 6 credits		**English: 6 credits**	
Composition I ENG101		Composition I ENG101	
Select one of the following courses:		*Select one of the following courses:* Journalism	
Journalism ENG210	3	ENG210	3
Humor in Literature ENG256	3	Humor in Literature ENG256	3
Humanities: 6 credits		***Humanities: 3 credits***	
Introduction to Art HUA101	3	*Environmental Ethics HUP108*	3
Introduction to Music HUM 101	**3**		
Social Science: 3 credits		**Social Science: 3 credits**	
Urban Sociology SSN187	3	Urban Sociology SSN187	3
Natural and Applied Sciences: 16 credits		**Natural and Applied Sciences: 16 credits**	
Fundamentals of Chemistry I SCC201	4	Fundamentals of Chemistry I SCC201	4
Fundamentals of Chemistry II SCC202	4	Fundamentals of Chemistry II SCC202	4
General Physics I SCP231	4	General Physics I SCP231	4
General Physics II SCP232	4	General Physics II SCP232	4
Mathematics: 19 credits		***Mathematics: 15 credits***	
Calculus I MAT201	4	Calculus I MAT201	4
Calculus II MAT202	4	Calculus II MAT202	4
Calculus III MAT203	4	Calculus III MAT203	4
Differential Equations MAT204	**4**	Linear Algebra MAT210	3
Linear Algebra MAT210	3		
Specific Program Requirements: 12credits		***Specific Program Requirements: 17 credits***	
Co-op Prep for Engineering Science	0	Co-op Prep for Engineering Science	0
Engineering Lab I/Internship I MAE101	1	Engineering Lab I/Internship I MAE101	1
Engineering Lab II/Internship II MAE103	2	Engineering Lab II/Internship II MAE103	2
C/C++ Programming MAC125	3	C/C++ Programming MAC125	3
Electrical Circuits MAE213	3	*Intro to Earth System Engr & Science MAE106*	**4**
Thermodynamics I MAE219	**3**	*Environ Engr and Earth Systems MAE217*	**4**
		Environ Engineering Data Analysis MAE264	**3**
		OR	
		Environ Remote Sensing (elective) MAE 290	*3*
Total Credits:	**62**	**Total Credits:**	**60**

6. COST ANALYSIS

THE CITY UNIVERSITY OF NEW YORK
LAGUARDIA COMMUNITY COLLEGE
MATHEMATICS, ENGINEERING, AND COMPUTER SCIENCE DEPARTMENT
PROPOSAL FOR A NEW ACADEMIC PROGRAM IN ENVIRONMENTAL ENGINEERING AND EARTH SYSTEM

Table 1: Expenditure Estimates for the Proposed Program

1. Personnel	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Full-Time Faculty				1	1
Total Compensation of Full-Time Faculty				$59,608	$61,903
Number of Adjunct Faculty	0	1	1	1	1
Total Compensation of Adjunct Faculty		$9,000	$9,000	$9,000	$9,000
Number of Lab Technicians (1 CLT)	1	1	1	1	1
Total Compensation of Adjunct Lab Technicians	$6,250	$6,250	$6,250	$6,250	$6,250
Total Personnel Costs	$6,250	$15,250	$15,250	$74,858	$77,153
II. OTPS					
New Equipment & Supplies Purchases for Environmental Engineering Laboratory See Page 15	$114,475 Lab Start-up	$30,300 Replacement cost for items listed in page See pg. 15	$12,000 Replacement cost for items listed in page See pg. 15	$20,500 Replacement cost for items listed in page See pg. 15	$26,000 Replacement cost for items listed in page See pg. 15 And new equipments

The College will assume responsibility for the cost of the Laboratory.

Projected Revenue Related to the Proposed Program

	1ST YEAR ACADEMIC YEAR	2ND YEAR ACADEMIC YEAR	3RD YEAR ACADEMIC YEAR	4TH YEAR ACADEMIC YEAR	5TH YEAR ACADEMIC YEAR
Tuition Revenue	**$28,000**	**$56,000**	**$84,000**	**$112,000**	**$112,000**
1. From Existing Sources					
2. From New Sources					
3. Total					
State Revenue	**$18,400**	**$34,500**	**$52,900**	**$69,000**	**$69,000**
4. From Existing Sources					
5. From New Sources					
6. Total					
Other Revenue					
7. From Existing Sources					
8. From New Sources					
9. Total					
Grand Total	**$46,400**	**$90,500**	**$136,900**	**$181,000**	**$181,000**
10. From Existing Sources					
11. From New					
Sources					
TOTAL					

Tax Levy State Funding $2,300 X FTE
Tuition revenue calculated as follows:

<u>Year I</u>
10 new students @$2,800 **$28,000**
State Revenue, model based on per capita aid of 8 * $2,300/FTE: **$18,400**

Year 1: Total **<u>$46,400</u>**

<u>Year 2</u>
20 new students @$2,800 **$56,000**
State Revenue, model based on per capita aid of 15 * $2,300/FTE: **$34,500**

Year 2: Total **<u>$90,500</u>**

Year 3

30 new students @$2,800	**$84,000**
State Revenue, model based on per capita aid of 23 * $2,300/FTE:	**$52,900**
Year 3: Total	**$136,900**

Year 4

40 new students @$2,800	**$112,000**
State Revenue, model based on per capita aid of 30 * $2,300/FTE:	**$69,000**
Year 4: Total	**$181,000**

Year 5

40 new students @$2,800	**$112,000**
State Revenue, model based on per capita aid of 30 * $2,300/FTE:	**$69,000**
Year 5: Total	**$181,000**

Facilities and Equipment

An integral component of the program is a two-semester lab experience designed to give exposure to the basic principles of environmental engineering as well as to test students' understanding of physical concepts. This laboratory experience will teach transferable and practical skills that will prove invaluable to students. Experiments will teach students to recognize the environmental problems associated with earth and atmospheric systems such as global warming, air pollution and industrial systems. Other experiments have been designed to stimulate student's technical thinking and awareness of product and design development.

The laboratory workstations will provide all the tools the students will need to perform the experimentation included in the course syllabi. A central component will be the availability of Lidar, satellite remote sensing, a CIMEL Automatic Sun-tracking Photometer and laser beam analysis. Students will posit a physical series of events and using specially designed software write the required program. They will be able to run a simulation of the action. In the laboratory, students are introduced to modeling, remote sensing technology, earth materials, and environmental tool used by earth scientists.

The college will renovate an existing space to serve as the environmental engineering lab. The design calls for seven work stations accommodating 15 students and a faculty station. The details concerning the equipment required to outfit the laboratory are in the Budget/Cost Assessment section below.

Budget/Cost Assessment:

Item	Quantity	Product Description	Unit Price	Extended Price
1	10	Ph. 1-800-728-6999 Edmunds Scientific: Solar Cell	$19.95	$200.00
2	6	Edmunds Scientific: Polarizing Discs	$29.95	$180.00
3	6	Edmunds Scientific: Fresnel Lens	$29.95	$180.00
4	5	Edmunds Scientific: Laser Pointers Red/Blue	$169.95	$850.00
5	5	Edmunds Scientific: Laser Pointers class 3a	$49.95	$250.00
6	3	Mouser Electronics (part # 615-4040A) (B&K 4040A) Function Generators FG 0.2HZ-20MHZ Phone: 800.346.6873	$619.00	$1857.00
7	1	Mouser Electronics Analog Oscilloscope, Bandwidth 100 MHz, Maximum Voltage 400 Peak to Peak Or 250 Volts, Vertical Deflection 1/5 Millivolts/Volts, Rise Time 3.5 Nanoseconds (B&K 2190B)	$1599.00	$1600.00
8	15	Mineral sets (Identification)	$100.00	$1500.00
9	15	Rock sets (Identification and Interpretation)	$80.00	$1200.00
10	15	Desktop computers	$1,000.00	$15,000.00
11	Software	ArcGIS software, (2-D representations of the earth, structure maps, topographical maps, spatial analysis programs)	$4,000.00	$4,000.00

12	Software	Matlab software (already installed in the MEC labs)		
13	Software	Virtual courseware for Earth science software, Microsoft office, Internet Explorer, STELLA software		$1,000.00
14	Software	ENVI (Environmental and Remote Sensing for Engineering statistical analysis and simulations using LIDAR and NASA/NOAA Satellite Data)		$2000.00
15	1	CIMEL Automatic Sun-tracking Photometer	$47,158.00	$47,158.00
16	1	Complete Laser Beam Analysis Set	$7,500.00	$7,500.00
17		OTPS, Capital Facilities and Furniture		$30,000
		Total		**$114,475.00**

Appendix A
New Course Syllabi

MAE106: Introduction to Earth System Engineering & Science
3 lecture hours and 3 lab hours, 4 Credits

Pre/co/requisite: MAT200
SCC 201

Course Description:
This course will present a systematic global view of the features, processes, and underlying basic science of the earth, atmosphere, and oceans, emphasizing environmental applications.). Topics covered include system science, global perspectives on earth's complex evolutionary systems, global warming, toxic volcanic hazards and groundwater remediation. In the laboratory, students are introduced to modeling, remote sensing technology, earth materials, and environmental tools used by earth scientists.

Text: Kump, L.R.**,**Kasting, J.F. and Crane, R.G., "The Earth System" (Second Edition, 2004), Pearson Education, ISBN # 0-13-142059-3

Reference: Trujillo "Earth System and Oceanography", Custom book, Pearson Custom Publishing, ISBN # 0-558-08593-8

Grading:

Exam #1	20%
Exam # 2	20%
Final Exam	30%
Labs and Projects	30%

Course Objectives:

By the end of this course, students should have a thorough understanding of:

- Solar Systems
- Earth's structure and composition, plate tectonics and geologic time
- Basic earth and atmospheric science, and remote sensing as a diagnostic tool
- Environmental effects such as global warming and climate change

Course Outline

Week	Topics	Reading	Labs
1	Introduction, System Science: How the earth works, Geology: Assembling the earth over time	Chapter 1	
	Geosciences (Astrogeology, Includes Planetology – Origin of the Universe/Solar system; Astrobiology – Origin of Life)	Chapter 10 Supplement 1	Lab 1: Mineral
2	Assembling Planet Earth: Mineralogy – Petrology (Supplement 2; Petro=rock – logy=logic = rock-logic), Earth Layers	Chapter 7 Supplement 2	
	Earth Systems, Global Change: Short term, Long term	Chapter 1	Lab 2: Rock
3	Self-Assembling Systems: Mt. Hood (catastrophe; sand: self-assembly;), Thermodynamic Systems		
	Steady State, Chaos, Catastrophe Theory,	Supplement 3	Lab 3: Plat

	Uniformitariansism: Are accidents the result of carelessness or chaos theory?, What was one of the first successful arguments against catastrophe theory		tectonics,
	Exam # 1		
4	System Science: Deep Earth System: System Science, Representing couplings, Daisy World, Background: Tectonics and Volcanoes	Supplement 4	
	The Mid-Ocean Ridge System – Surface expression of the deep earth system , Andesites - A second chain in the deep earth system linkage (Tectonic Interactions, Large Igneous Province - A third expression of deep earth processes (Tectonic-Mantle-Core Interaction)	Supplement 4	Lab 4: Waves
5	Earth structure: Tracking Deep Earth Processes, Geophysics, Seismic information, Paleomagnetism, Geographic Information Science	Chapter 7 Supplement 4	Lab 5: Density
6	System Science: Ocean Systems: Chemical Engine – transfer of material between major reservoirs, Carbon and silica cycles	Chapter8	Lab 5: Density
	Physical Engine – transfer of energy within major reservoirs: Circulation of the Oceans		
	Coastal systems	Chapter 8	
	Exam # 2		
7	System Science: Atmosphere, Origin of the atmosphere, Global warming and the atmosphere, and Atmospheric Circulation	Chapter 11, 3, & 4	Lab 6: Field Trip
8	Hurricanes , LIDAR sensing , Where is the sunshine?		Lab 7: Ground
9	Solar Cell Experiments: System Science: Atmosphere-Rock interactions	Supplement 5	
	Lithospheric plates, mountains and climate , Weathering and climate, River dynamics and weathering	Supplement 5	
	Geomorphology, Weathering and mantle flow	Supplement 6	
10	System Science: Atmosphere-Ocean interactions, Southern Oscillation		Lab 8: Storms
	El Nino-Southern Oscillation	ENSO: Chapter 9,15	
	Ice Ages, Mr. Glacier, Causes of ice ages, Warning from the ice,	Supplement 7	Lab 9: Remote Sensing I
11	Global Warming	Chapter 16	Lab 10: Remote Sensing II
	Ozone Depletion	Chapter 17	Lab 11: Cycles and Prediction
12	Climate Stability or Evolution , Review for Final Exam	Supplement	
	Final Exam		

MAE217: Environmental Engineering and Earth Systems
3 Lecture hours and 2 lab hour, 4 Credits

Prerequisite: MAE106

Course Description:
Analysis and modeling of the large-scale cycles and systems in the Earth Sciences including plate tectonics and climate change with reference to underlying physical, chemical and biological principles. Physical and chemical properties of earth materials are examined. Software such as EXCEL, Visual Basic and PowerPoint are all used extensively.

Text: Skinner, Brian J., Porter, Stephen C. and. Botkin, Daniel B. "The Blue Planet: An Introduction to earth System Science" (Second Edition, 1999), John Wiley & Sons, ISBN # 0-471-16114-4

Grading:

Exam # 1	25%
Exam # 2	25%
Final Exam	25%
Labs and Projects	20%
Homework	5%

Course Objectives

By the end of this course, students should have a thorough understanding of:
1. Major stages and key events in the earth's evolution
2. Systems relationships in the context of planetary events
3. Planetary materials: light, minerals and rocks
4. Integration of science and engineering in planetary processes
5. Representation of planetary processes: mapping, databases and remote sensing

Course Outline

Week	Topic	Reading
	Review: Plate Tectonics, Climate Change	
	Density	
1	Density and Porosity	
	Buoyancy and Viscosity: Newton's Laws of Motion	
	Thunderstorms, Subduction, Plumes, Isostasy	
2	Minerals and their Properties	HW #1
	Snell's Law of Refraction, Earth Composition	
	Waves: Tsunamis	
3	Waves: Earthquakes and Tomography	HW #2
4	**Exam #1**	

	Heat and Energy	
	Sunshine: Inverse Square and Cosine Laws	
	Radiation Laws: Planck, Wien, Stefan-Boltzmann	
	Scattering and Absorption: Sky Color, Aerosols, Ozone	HW # 3
	Remote Sensing	
5	Greenhouse Models	
	Conduction and Diffusion: Sea Ice Project # 2	HW # 4
6	**Exam #2**	
	Conduction: Daily and Seasonal Temperatures	
7	Conduction: Sea Ice	
	Convection: Heat Transport	HW # 5
8	Climate Systems Models I	
	Gas, Liquid, Solid: Phase Diagrams, Cycles	
9	Precipitation and Evaporation	
	Project # 3	HW # 6
10	Earth Systems Models: Plate Tectonics	
	Earth Systems Models: Plate Tectonics	
11	Earth Systems Models: Plate Tectonics	
	Review	
12	**Final Exam**	

MAE264: Environmental Engineering Data Analysis

3 Lecture hours and 1 lab hour, 3 Credits

Prerequisites: MAT203 and MAC125

Course Description:
The course introduces the basic notions and methods of probability theory, statistics and decision through their application to environmental engineering problems. Emphasis is placed on probabilistic modeling and analysis of environmental engineering problems, Bayesian statistics, risk analysis, and decision under uncertainty. This course provides a solid base in applied probability and Bayesian statistics as used by environmental engineers, and introduces students to the increasingly important topic of risk analysis. The course also presents formulation and solution of engineering type probabilistic problems through computer based methods, including developing computer codes using commercial software such as MATLAB and Microsoft Excel.

Text:

Ang, A. and Tang, W.H., "Probability Concepts in Engineering" (Second Edition 2007), John Wiley, ISBN-10 0-471-72064-X

Software: Microsoft Excel and Matlab

Grading:

Home Work	10%
Lab Assignments	15%
Projects	10%
Quizzes	10%
Midterm Exam	25%
Final Exam	30%

Course Objectives:

By the end of this course, students should have a thorough understanding of:

1. Apply basic concepts of statistics in description of Environmental data
2. Apply commonly used probabilistic models for Engineering Problems
3. Conduct Environmental data analysis, interpolation, curve fitting, and quantify the degree of fit using definition of error
4. Optimization and linear regression for engineering problems
5. Perform basic matrix operations for engineering problems
6. Formulate and Solve systems of linear equations by Gaussian elimination, and matrix inversion for engineering problems

Course Outline

Week	Topics	Reading
1	Introduction, Uncertainty in Engineering, Design and Decision Making Under Uncertainty, Planning and Design of Traffic Transportation Infrastructure, Planning and Design of Hydro systems, Design of Geotechnical Systems, and Applications in Quality Control and Assurance in Engineering	Chapter 1: Roles of Probability and Statistics in Engineering
2	Characteristics of Engineering Problems Involving Probabilities, Probability as a Measure Necessary and Useful for solving Engineering Problems (i.e., problems that are nondeterministic), Fundamentals of Mathematical Probability Theory Useful for the Formulation of Probabilistic Problems in Engineering,	Chapter 2: Fundamental of Probability Models in Engineering
3	Random Events and Random Variables for Engineering Problems, Useful Probability Distributions for Engineering Applications such as a series of piles driven into a soil stratum, monitoring the daily water quality of river on the downstream sides of an industrial plants, etc.	Chapter 3: Analytical Models for Random Phenomena in Engineering and Physical Sciences
	Exam #1	
4	Multiple Random Variables for Engineering Applications, Covariance and Correlation between two random variables Project # 1	Chapter 3: Analytical Models for Random Phenomena in Engineering and Physical Sciences

5	Introduction to Derived Probability Distributions for Engineering Problems, Mathematical Expectation of a Function, and Mean and Variance of General Functions Useful for Engineering Problems	Chapter 4: Functions of Random Variables for Engineering Problems
6	Numerical Simulations for Solving Engineering Problems Containing Uncertainty, Engineering Problems Involving Aleatory and Epistemic Uncertainties, and Monte Carlo Simulation (MCS) for Formulating and Solving Probabilistic Engineering Problems	Chapter 5: Computer-Based Numerical and Simulation Methods in Probability in Many Practical Engineering situations
	Exam 2	
7	Role of Statistical Inference in Engineering, Statistical Estimation of Parameters of Observational Data on Natural Processes such as rainfall intensities, flood levels of rivers, earth quake magnitudes and frequencies, traffic volumes, pollutant concentrations etc., Hypothesis Testing for Engineering Applications	Chapter 6: Statistical Inference from Observational Data
8	Confidence Interval of the Mean, Proportion and Variance Used for Engineering Problems, Engineering Problems Involving Measurement Theory such as in surveying and photogrammetry	Chapter 6: Statistical Inference from Observational Data
9	Testing Goodness–of-Fit of Distribution Models for Environmental Data Analysis: The Kolmogorov–Smirnov (K-S) and Anderson-Darling (A-D) Tests Project # 2	Chapter 7: Determination of probability Distribution Models in Engineering
	Exam 3	
10	Introduction to the Regression Model: Regression with Constant Variance, Variance in Regression Analysis, Confidence Intervals in Regression, Correlation Analysis for Engineering Problems	Chapter 8: Regression and Correlation Analysis for Engineering Problems
11	Linear Regression with Non-constant Variance, Multiple Linear Regression, Nonlinear Regression, and Applications of Regression Analysis in Engineering such as in traffic engineering, civil engineering and environmental engineering etc.	Chapter 8: Regression and Correlation Analysis for Engineering Problems
12	Bayesian approach to Typical Engineering Problems Involving Probability and Statistics, Bayesian Regression and Correlation Analysis for Engineering problems, Review for Final Exam	Chapter 9: The Bayesian Approach to Typical Engineering Problems
	Final Exam	

MAE290: Environmental Remote Sensing (elective)

3 Lecture hours and 1 lab hour, 3 Credits

Prerequisites: MAT203, MAC125, MAE 103, and SCP232

Course Description

Remote sensing enables one to learn about the Earth's surface and atmosphere from a distance, surveying and studying large regions more easily than would be feasible on the ground. This course is an introduction to the techniques of observing the Earth from air- and space-borne instruments. Topics to be covered include basic concepts of geometry and scale associated with making remote measurements, electromagnetic properties of the Earth's surface materials, range

of instruments used to observe the Earth and applications of satellite remote sensing to geological and environmental questions.

Text: Jensen John R., "Remote Sensing of the Environment: An Earth Resource Perspective" (Second Edition 2007), Pearson Education, ISBN # 0-13-188950-8

Grading:

Lab Assignments	**20%**
Three Exams	**45%**
Projects	**10%**
Final Examination	**25%**

Course Objective:

By the end of this course, students will have a thorough understanding of:

1. History and scope of remote sensing
2. Photographic sensors and aerial photo interpretation
3. Properties of satellite images
4. Active microwave remote sensing and Lidar
5. Integration of remote sensing and GIS
6. Hyperspectral and thermal remote sensing
7. Spatial resolution, spectral resolution, and radiometric resolution
8. Accuracy assessments of maps and products
9. Various applications to agriculture, environment, forestry, geology, hydrology, landscape, meteorology, oceanography, soil, and urbanization monitoring
10. Use of computer software systems for image processing and analysis

Course Outline

Week	Topics	Reading
1	Course introduction , History and Scope of Remote Sensing	Chapter 1
2	Electromagnetic radiation	Chapter 2
3	Photogrammetry, aerial photo interpretation, and photographic sensors	Chapter 3 and handouts
	Exam #1	
4	Interaction of EMR with the surface , Principles of detection	Chapter 4 & 5
5	Resolution: spatial, spectral, temporal, radiometric and Multispectral and hyperspectral remote sensing	Chapter 7 & 8
6	Active microwave remote sensing, and Interferometry	Chapter 9
	Exam #2	
7	LIDAR and Passive microwave remote sensing	Chapter 9 & 10
8	Applications: Remote Sensing of Vegetation	Chapter 11
9	Applications: Urban remote sensing and societal applications	Chapter 13
	Exam # 3	
10	Applications: Land cover/land use change, Soils and geomorphology	Chapter 14
11	Applications: remote sensing of cryosphere	Handouts
12	Applications: GIS, Plant, Earth, and hydrospheric Sciences	Handouts
	Final Exam	

Appendix B
Description of existing courses

HUP108 Environmental Ethics

3 credits; 3 hours
This course offers students an opportunity to investigate ethical issues concerning the environment. The study of Environmental Ethics relates in complex ways to moral theory, as well as global issues in economics, politics and science. This course will explore such environmental questions and potential solutions as: Our personal responsibilty for solving environmental problems; Health concerns, and our obligations to ourselves, each other and to the environment.
Prerequisite: CSE099, ENA/ENG099

SSN187 Urban Sociology
3 credits; 3 hours
This course examines changing ideas about the city and the changing impact of the city on American lifestyles. With reference to New York City, the course explores the origins and the social structure of the city. It focuses on the relationship of class to family, gender, education, ethnicity, religion, politics and economics. Visits to housing projects, community organizations, or service delivery agencies will familiarize the students with the issues of planning and change in the city.
Prerequisite: ENA/ENG099, MAT095/MAB095, SSS100 or SSB110 or SSE101 or SSY101 or SSB102

ENG101 Composition I
3 credits; 4 hours
In this course students focus on the process of writing clear, correct and effective expository essays in response to materials drawn from culturally diverse sources. Emphasis is placed on using various methods of organization appropriate to the writer's purpose and audience. Students are introduced to argumentation, fundamental research methods and documentation procedures. Students write frequently both in and out of class. Admission to this course is based on college placement test scores.
Prerequisite: CSE095, ENA/ENG099
Pre/Co-requisite: CSE099

ENG210 Journalism: Its Scope and Use

3 Credits; 3 hours
This course provides an overview of journalism with an emphasis on print and related areas, such as in-house publications and public relations writing. The history and impact of journalism, particularly the changing role of women and minorities in the press will also be covered. News reporting, editing, production, newsroom organization and management will be explored through writing assignments, demonstrations and visits to LaGuardia's newspaper as well as professional news publications.

Prerequisite: ENG101

ENG256 Humor In Literature
3 credits; 3 hours

This course introduces students to humor in literature from the Classic period to the present in the genres of drama, poetry, and fiction and provides them with interpretive skills required for an appreciation and understanding of the texts. In reading the work of such authors as Aristophanes, Shakespeare, Ishmael Reed, and Fran Lebowitz, the class will define and examine examples of humorous literature such as satire, romantic comedy, parody, and farce.
Prerequisite: ENG 101

SCC201 Fundamentals of Chemistry I and II
4 credits; 6 hours
This is a two-semester sequence covering the basic concepts of chemistry and their historical development. The experimental nature of chemistry, as well as the role of chemistry in many aspects of daily life is stressed. Among the topics studied are: SCC201: Atomic structure, chemical bonding, chemical reactivity, quantitative relationships in chemical reactions, thermo-chemistry, and gases. SCC202: Liquids, solids, solutions, acid-base theory, chemical kinetics, chemical equilibrium, chemical thermodynamics, electrochemistry, nuclear chemistry.
Prerequisite: for SCC201: CSE099, ENA/ENG099, MAT096/MAB096 for SCC202: SCC201

SCC201-SCC202 Fundamentals of Chemistry I and II
4 credits; 6 hours
This is a two-semester sequence covering the basic concepts of chemistry and their historical development. The experimental nature of chemistry as well as the role of chemistry in many aspects of daily life is stressed. Among the topics studied are: SCC201: Atomic structure, chemical bonding, chemical reactivity, quantitative relationships in chemical reactions, thermo-chemistry, and gases. SCC202: Liquids, solids, solutions, acid-base theory, chemical kinetics, chemical equilibrium, chemical thermodynamics, electrochemistry, nuclear chemistry.
Prerequisite: for SCC201: CSE099, ENA/ENG099, MAT096/MAB096 for SCC202: SCC201

SCP231 General Physics I
4 credits, 6 hours (3 lecture, 1 recitation, 2 lab)
This is the first of two calculus-based physics courses. The topics covered in the first semester include: motion in one, two and three dimensions; vectors; forces and moments; Newton's Laws; work and energy; center of mass; momentum and collisions; rotational motion; moment of inertia; hydrostatics and hydrodynamics, periodic motion; temperature and heat; Laws of Thermodynamics.
Prerequisite: CSE099, ENA/ENG099, MAT201

SCP232 General Physics II
4 credits, 6 hours (3 lecture, 1 recitation, 2 lab)
This is the second calculus-based physics course. Topics covered include: wave motion; wave interference; propagation of light; diffraction; electric charge and electric field; Gauss' Law;

electric potential, capacitance, and dielectrics; DC circuits; magnetism; Lenz's Law; AC circuits; electromagnetic waves; modern physics.
Prerequisite: SCP231, MAT202

MAT201 Calculus I
4 credits; 4 hours

This is the first course in a three-semester sequence, designed to give students an appreciation for the intellectual power and beauty of calculus, as well as a thorough grounding in computational techniques. Applications to economics and the basic sciences will play an essential role. Topics to be covered include: limits, velocity and acceleration models, derivatives, Intermediate Value Theorem, Rolle's Theorem, and the Mean Value Theorem, implicit differentiation and related rates, Newton's Method, anti-derivatives, Fundamental Theorem of Calculus, and elementary integration.
Prerequisite: MAT200

MAT202 Calculus II
4 credits; 4 hours
This is the second course of a three-semester sequence, with the traditional focus on integration technique. Topics to be covered include: integration by substitution and by parts, trigonometric substitution, using a Table of Integrals, applications to volume, surface area, and arc length, solving elementary first and second order differential equations, sequences and series.
Prerequisite: MAT201

MAT203 Calculus III
4 credits; 4 hours
The third course in the Calculus sequence is intended to build on the concepts and techniques of MAT 201-202, and to provide a more rigorous conceptual grounding for the entire sequence. Topics to be covered include partial derivatives, critical points and generalized second derivative test, 2- and 3- vectors in Euclidean coordinate systems, space curves and surfaces, double and triple integrals, parameterizations, and vector calculus as far as line integrals and Green's Theorem on closed curves.
Prerequisite: MAT202

MAT204 Elementary Differential Equations
4 credits; 4 hours
This course will consider selected problems and mathematical models which generate first and second order differential equations. Both numerical and analytical methods will be used to obtain solutions for first and higher order differential equations. Power series solutions will be emphasized, and where feasible, solutions utilizing computer methods will be explored.
Prerequisite: MAT202
Pre/Co-requisite: MAT203

MAT210 Linear Algebra

3 credits; 3 hours
This course is designed to introduce the students to the theory and applications of algebraic structures. This is done by studying the structure and properties of the matrix. The matrix is viewed both as an object possessing algebraic structure and an aid to computation. Systems of equations and their solutions are studied, and the concepts of basis and dimension are developed. Applications are discussed, including linear programming and computer programs.
Prerequisite: MAT201

MAC 125 C/C C++ Programming

3 credits; 4 hours (3 lectures, 1 lab)
This course introduces the C and C++ programming through the implementation of various algorithms and the use of an object-oriented approach. Topics include: input/output, expressions, operators, basic data types, functions, flow-control, macros and classes. Structured as well as object-oriented techniques will be emphasized. The course emphasizes structured design and problem solving. Laboratory assignments are required.
Prerequisite: MAC101 or MAC109, MAT201

CPP 024 Co-op Prep for Engineering Science

0 credits; 1 hour
This course will enable engineering majors to explore and/or confirm career interests and plans and develop professional literacy in the field of engineering. Topics include: self-assessment, career and educational research and planning, strategies to access professional opportunities, contemporary issues and ethics in engineering, and the impact of diversity in the workplace. Students will be involved in web-based activities, group work, and online reading and writing activities to meet course objectives. (Closed to all students who are not majoring in the Engineering Science Program.)

Prerequisite: ENG 101, MAT 200

FSM 024 New Student Seminar/Engineering

0 credits 1 hour
New Student Seminar is designed to provide an orientation for students to LaGuardia and to provide students with the knowledge and skills they need to be successful in college. Students will learn college policies and academic requirements, effective study skills, and test-taking strategies. In addition, students will engage in self and career exploration as well as academic planning and advisement

Appendix C
SURVEY RESULTS

Surveys were conducted at LaGuardia Community College and the neighboring high schools of western Queens. The results indicate a strong interest in Environmental Engineering and Earth System, both at the college and at the high school levels.

As a result of a survey (see appendix C) given to LaGuardia, International, and Middle College High School students, we have data that show strong student interest in the New ***Environmental Engineering and Earth System*** related course offerings. Out of the 190 students surveyed, 118, or 62.1%, indicated an interest in an Environmental Engineering career. If we exclude students from Newton High School (73), which may have skewed the curve in favor of engineering, then 83 out of 117 or (71%) students expressed an interest in engineering science. The students surveyed were all members of under-represented groups.

A breakdown by gender reveals that of those expressing interest in ***Environmental Engineering and Earth System***, 68/190 (35%) were male and 50/190 (26%) were female, while of those indicating no interest in Environmental Engineering, 44/190 (23%) were female and 28/190 (14.7%) were male. The following table summarizes the Environmental Engineering and Earth System Survey results.

Table: Summary of the Environmental Engineering and Earth System Survey from High School Students

School Name	**Yes**			**No**			**Total**
Newton High School	35	Male	20	38	Male	15	**73**
		Female	15		Female	23	
FK.Lane High School	41	Male	25	30	Male	11	**71**
		Female	16		Female	19	
LaGuardia CC HS	30	Male	17	03	Male	1	**33**
		Female	13		Female	2	
Others High School	12	Male	06	01	Male	1	**13**
		Female	06		Female	0	
Total	118			72			**190**

Based on the strong positive response obtained from the surveys, we are projecting the following initial enrollment and growth over a five-year period as follows:

Year	# of Students
1	10
2	20
3	30
4	40
5	40

Appendix D
SURVEY QUESTIONNAIRE

The Mathematics, Engineering and Computer Science Department at LaGuardia Community College is developing an Associate of Science degree program in Environmental Engineering, with approximately 60 credits. This two-year degree program would prepare students for transfer to a senior college (such as CCNY, NYU, Columbia U., Cornel U., etc.) to continue their studies leading to a bachelor's degree in Environmental Engineering and other engineering majors. More environmental engineers will be needed to comply with environmental regulations and to develop methods of cleaning up existing hazards. A shift in emphasis toward preventing problems rather than controlling those that already exist, as well as increasing public health concerns resulting from population growth, also are expected to spur demand for environmental engineers. In the Federal Government, average annual salaries for environmental engineers ranged from $ 43,180 to $106,230 in 2007. Average starting salary by environmental engineer for Bachelor's degree is $ 47, 960 in 2007. We offer **scholarships (NOAA-CREST and NASA-COSI)** as well. You have a great opportunity to work for **NASA or NOAA and/or any government agencies** after graduation if you are eligible. Please assist us in identifying students who would be interested in this program by completing the following questionnaire.

I am interested in a career in Environmental Engineering /Science

Yes No

If you answer yes to question #1, please check the area of engineering in which you are most interested (please check only one).

1. Environmental Science /Engineering
2. Atmospheric Science /Engineering
3. Oceanic and Earth Science/Engineering
4. Other (please specify: _____)

Please check the highest academic degree you are planning to obtain.

1. High School Diploma
2. Associate's Degree (2 years)
3. Bachelor's Degree (4 years)
4. Master 's Degree
5. Doctoral Degree
6. Other (please specify:_____)

Please check all of the math courses you have taken or are currently enrolled in:

1. Basic Math or MAT 095
2. Algebra or MAT 096
3. Algebra II
4. Geometry
5. Trigonometry
6. Statistics or MAT 120
7. Pre-Calculus or MAT 200
8. Calculus I or MAT 201
9. Calculus II or MAT 202
10. Calculus III or MAT 203
11. Technical Math I or MAT 241
12. Technical Math II or MAT 242
13. Ordinary Differential Equations
14. Others: _____

Please check all the science courses you have taken or are currently enrolled in:

1. Earth Science
2. Biology
3. Chemistry
4. Physics I , Physics II
5. Physics III
6. Others: _____

Demographic Information: High School: _____Class: _____

LaGuardia students please enter the number of credits completed: _____

Gender:

1. Female
2. Male

Race:

1. White
2. African-American
3. Hispanic
4. Asian
5. Other: _____

Name (optional): _____

Appendix E

Biographical Information of participating faculty members at LaGuardia CC

Dr. Yasser Hassebo holds a B.Sc. in electrical engineering from Menofia University in Egypt. He has an M.E. (2002) degree in electrical engineering from City College as well as an MPhil (2006) and a PhD (2007) in Electrical Engineering (Remote Sensing) from the CUNY Graduate School and University Center. Dr. Hassebo received a University Scholarship in 2002-2004 and a NOAA-CREST Fellowship in 2005-2007. He was also awarded the Grove School of Engineering Graduate Citation in 2002.

Currently, Dr. Hassebo is an assistant professor in the Mathematics, Engineering and Computer Science Department at LaGuardia Community College. Prior to joining LaGuardia Community College, Dr. Hassebo was a junior member of the Department of Electrical Engineering at the CCNY, where he taught several engineering courses including engineering laboratory, switching systems, control systems and control laboratory.

Dr. Hassebo has authored or co-authored more than 20 journal and conference papers. He has conducted research in the areas of optical remote sensing, light detection and ranging (Lidar). In addition to his Master's level research on control systems, Dr. Hassebo has conducted research in robotics design and control, fiber optics telecommunication, networking, and routing and wavelength assignment algorithms.

Dr. Zahidur Rahman received a B.E. in Electrical Engineering from the University of Engineering and Technology, Bangladesh, in 1996, an M.E. in Electrical Engineering from City College and a PhD (2008) in Electrical Engineering from the CUNY Graduate Center. Currently, Dr. Rahman is an assistant professor in the Mathematics, Engineering and Computer Science Department at LaGuardia Community College. His current research interests are in the area of satellite remote sensing, application of NOAA environmental satellite data, which include climate and weather impact on ecosystems, environmental hazards, and error correction of NOAA/GOES environmental satellite data due to several factors (such as an orbit drift, sensors deterioration, and synchronization etc) . In the past five years, he has authored or co-authored several international conference papers. Dr. Rahman was awarded a University Fellowship from 2002 to 2007.

COURSE PROPOSAL FORM

TYPE OF PROPOSAL
☒ PERMANENT
☐ EXPERIMENTAL

For office use only:
CCC
SENATE
CHANCELLOR

PROPOSING DEPARTMENT:	Natural and Applied Sciences

SECOND DEPARTMENT FOR JOINT PROPOSAL:	

COURSE TITLE: (maximum 50 characters and spaces)	Introduction to Chemistry

COURSE ABBREVIATION: (maximum 20 characters and spaces)	Intro. to Chemistry

COURSE NUMBER: Contact Registrar's Office for designated course number.	SCC205
TYPE NAME OF REGISTRAR CONTACT & GET INITIALS	Thomas Murasso

COURSE STATUS:	☒ NEW ☐ REVISED

CREDITS	4
PER WEEK:	
CLASSROOM HOURS	3
LAB HOURS	3
STUDENT HOURS	6
FACULTY HOURS	6

DO THE LAB HOURS REPRESENT FACULTY CONTACT HOURS?
☒ YES
☐ NO

IF THIS IS A REVISED COURSE, CHECK OFF ALL ITEMS BELOW THAT HAVE BEEN CHANGED:
☐ TITLE CHANGE
☐ CATALOG DESCRIPTION
☐ NUMBER OF CREDITS
☐ NUMBER OF HOURS
☐ PREREQUISITES
☐ COREQUISITES
☐ INSTRUCTIONAL OBJECTIVES
☐ PERFORMANCE OBJECTIVES
☐ GRADING STANDARDS
☐ LIBRARY ARTICULATION
☐ COMPUTER SOFTWARE ARTICULATION
☐ TOPICAL OUTLINE
☐ OTHER **Please specify:**

IF THE CLASSROOM HOURS & THE NUMBER OF CREDITS ARE NOT IDENTICAL, EXPLAIN THE DIFFERENCE BELOW:
Three laboratory hours equal (=) one credit hour

URBAN STUDIES
☐ YES
☒ NO

LIBERAL ARTS
☒ YES
☐ NO

REV. 07/18/05

CATALOG DESCRIPTION: **(maximum of 500 characters and spaces)**

The catalog description should provide students with a description of the course content and methodology. The reading level of the description should be designed for our student population. Also, since catalog descriptions will be used by other colleges as a basis for granting transfer credits, the description should provide adequate information to guide other colleges in their deliberations.

This course serves as an introduction to chemistry. Topics include measurements, atoms, the Periodic Table, ionic and molecular compounds, stoichiometry, energy, equilibrium, gases, liquids, solids, solutions, acids and bases. The laboratory component is designed to illustrate the fundamental laws and techniques of general chemistry. The course addresses the needs of students who require an introductory chemistry course that contains a laboratory component.

Course is Required for: **(e.g., students in the Occupational Therapy Program)**	**Course is Elective for:** **(e.g., students meeting the pre / pre-co / corequisites)**
None	Students meeting the pre-requisites

Course is Closed to: **(e.g., all students not meeting the pre / pre-co / corequisites**	**This Course Replaces:** **(If it is not a replacement course, write "none".)**
All students not meeting the pre-requisites	None

This course is part of the following curriculum (program), option, career pattern, cluster, and/or sequence.	**Was this course offered experimentally?**	**If offered experimentally, indicate when:**
Liberal Arts: Math & Science, Liberal Arts: Social Science & Humanities, Education	☐ **YES** ☒ **NO**	

PRE/PRE-CO/COREQUISITES: In determining these requirements, please consider the skills (i.e. reading level, writing level, mathematical ability) the student must possess in order to meet the performance objectives. If any minimum competencies are being waived, explain why they are not required.

Basic skills and/or ESL	Prerequisites	Pre/Corequisites	Corequisites
Reading (e.g., none, CSE095):	CSE099		
Writing (e.g., none, ENA099):	ENA/ENG/ESA099		
Mathematics (e.g., none, MAT096):	MAT096		
ESL (e.g., none, ESL097, ESL098):			

College-Level Course Prerequisites: List the highest college-level prerequisites within each discipline. Do not include embedded prerequisites for courses in this list – e.g., if ENG102 is a prerequisite, do not list ENG101.		
Prerequisites	**Pre/Corequisites**	**Corequisites**

Additional Pre/Pre-Co/Corequisites: Specify pre/pre-co/corequisite, e.g., Prerequisite EMT Certification; Prerequisite CPR Certification, etc.
None

This course will first be offered in: (e.g., Fall 12 week Session 2003)	Proposed maximum class size:
Fall I 2009	25

How many times per year will this course be offered?	Estimated # of students per year:
Twice	100

Subsequent to the first offering, this course will be offered in the following sessions: (check all that apply)	
☒ **FALL 12 Weeks**	☐ **FALL 6 Weeks**
☒ **SPRING 12 Weeks**	☐ **SPRING 6 Weeks**

Provide a rationale for the proposed course or course revisions.

This course is designed for students who require a 4 credit science course in order to transfer to a senior college or for students who need this course for graduation in their specific major.

Grading Standards:
Describe how you will assess the work of students in this class. Please be specific when describing types of assessment tools. Please note that the total of all categories (assignments, exams, oral presentations, research papers, etc.) must be 100%. If appropriate, list the number and percentage value of each type of assessment.
For example: 3 written quizzes at 10% each = 30%.

CATEGORY	%
4 exams @ 10% each	40
4 quizzes @ 3% each	12
8 homework @ 1% each	8
10 lab reports @ 2.5% each	25
10 pre-lab quizzes @ 0.5% each	5
1 laboratory final @ 10%	10
TOTAL	**100%**

Provide information about any government, legal, industrial, and professional requirements or vocational objectives, for which the course is designed.

Indicate if the course is being developed for a grant. If so, provide relevant details.

No

INSTRUCTIONAL OBJECTIVES:	**PERFORMANCE OBJECTIVES:**
These objectives should focus on the goals of the proposed course, that is, what the instructor expects to achieve. The instructional objectives must be part of the course outline distributed to students at the beginning of each session. Some examples of beginning phrases which may be used for an instructional objective follow. **During this course, the instructor expects to:** **enable..** **familiarize..** **introduce..** **provide the student with..** **reinforce..** **List of instructional objectives:** **During this course, the instructor expects to:**	**These objectives describe, in behavioral terms, what the students should be able to do at the end of the course. Your performance objectives must be part of your course outline and should parallel, if possible, your instructional objectives. Some examples of beginning phrases which may be used for a performance objective follow:** **At the conclusion of this course students will be able to:** **analyze..** **identify..** **compare and contrast..** **illustrate..** **compute..** **interpret..** **define..** **locate..** **describe..** **prepare..** **draw..** **solve..** **explain..** **write..** **List of performance objectives:** **At the conclusion of this course, students will be able to:**
1. Introduce students to measurements of length, mass, volume, and temperature of a substance with the correct number of significant figures. 2. Introduce students to the principles of atomic structure, physical and chemical properties of matter, isotopes, the Periodic Table, and the electron configuration of elements. 3. Familiarize students with the types of chemical bond and Lewis structures. 4. Explain the rules of writing and naming chemical formulas of ionic and molecutlar compounds. 5. Introduce students to the energy changes that accompany changes of state. 6. Introduce students to chemical reactions, types and balancing chemical equations. 7. Introduce students to the factors that affect the rate of chemical reactions.	1. Determine the number of significant figures in calculations involving measurements of length, mass, volume, and temperature. 2. Explain the principles of atomic structure, physical and chemical properties of matter, isotopes, and behavior of elements in the Periodic Table. 3. Describe the types of chemical bonds in a compound and draw Lewis structures of compounds. 4. Write the chemical formulas of ionic and molecular compounds. 5. Calculate the energy changes that accompany changes of state. 6. Write balanced equations and be able to identify types of chemical reactions. 7. Describe the factors that affect the rates of chemical reactions.

INSTRUCTIONAL OBJECTIVES (CONTINUED):	PERFORMANCE OBJECTIVES (CONTINUED):
8. Introduce the concept of chemical equilibrium and Le Chatelier's Principle.	8. Apply Le Chatelier's Principle to chemical equilibrium problems.
9. Introduce chemical quantities: Avogadro's number, formula mass, mole, molar mass, and illustrate how to do the calculations involving these quantities.	9. Solve chemical calculation problems involving Avogadro's number, formula masses, moles, and molar masses.
10. Explain the kinetic molecular theory of gases, Boyle's Law, Charles' Law, Avogardro's Law, Gay-Lussac's Law, Ideal Gas Law and Dalton's Law, and how these laws are used in solving problems.	10. Apply the Gas Laws to gases.
11. Introduce students to the principles of solution formation, electrolytes, and non-electrolytes and to the different ways expressing concentration of solutions.	11. Apply the concepts of solution formation, electrolytes, and non-electrolytes to solutions. Calculate the concentrations of solutions.
12. Introduce the students to the concepts of acid, bases, pH, and buffers.	12. Illustrate the behavior of acids and bases. Calculate the pH of acidic and basic solutions and buffers.
13. Develop basic laboratory skills for proper handling of chemicals.	13. Apply basic laboratory skills for proper handling of chemicals.

COURSE OUTLINE:
Provide a weekly, topical outline that will be used to guide instructors in teaching this course. The weekly topical outline should delineate 12 weeks of instruction and the thirteenth week should be labeled "Final Exam." If a course is designed for 6-week sessions only, the outline should delineate 6 weeks of instruction and the seventh week should be labeled "Final Exam."

Lecture I: Matter and Life

Lecture II: Measurements in Chemistry, Quiz 1

Lecture III: Atoms and the Periodic Table, Exam 1

Lecture IV: Ionic Compounds

Lecture V: Molecular Compounds, Quiz 2

Lecture VI: Chemical Reactions: Classification and Mass Relationships, Exam 2

Lecture VII: Chemical Reactions: Mass Relationships

Lecture VIII: Chemical Reactions: Energy, Rates, and Equilibrium, Quiz 3

Lecture IX: Gases, Liquids, and Solids, Exam 3

Lecture X: Solutions

Lecture XI: Solutions, Quiz 4

Lecture XII: Acids and Bases

XIII: Exam 4

COURSE OUTLINE: (CONTINUED)

Lab I: Check-in - Laboratory Techniques

Lab II: Density Determination

Lab III: The Separation of the Components of a Mixture

Lab IV: Determination of the formula of a Metal Oxide

Lab V: Water of Hydration

Lab VI: Classes of Chemical Reactions (Part I)

Lab VII: Classes of Chemical Reactions (Part II)

Lab VIII: Chemical Properties of Consumer Products

Lab IX: Factors that affect Rates of Reactions

Lab X: Charles's Law

Lab XI: Analysis of Vinegar by Titration

XII: Lab final and checkout

COURSE OUTLINE (CONTINUED):

COURSE OUTLINE (CONTINUED):

LIBRARY/FACILITIES ARTICULATION

Please give author, title, edition, publisher and date for each book; title and publisher for each periodical title. Provide ISBN or ISSN if easily accessible. For media items, include distributor. After each item, indicate the status as follows: in collection (IC), on order (O/O), or recommended for purchase (R).

#1 TEXTBOOK(S): (Text on tape will be ordered if available.) (Specify STATUS at end of each entry.)	
AUTHOR(S):	John McMurry, Mary E. Castellion, David S. Ballantine
TITLE:	Fundamentals of General, Organic, and Biological Chemistry
EDITION:	5th ED
PUBLISHER:	Pearson/Prentice Hall
DATE:	2007
ISBN:	9780131877481
STATUS: (Check one)	☐ IC ☐ 0/0 ☒ R
AUTHOR(S):	Karen C. Timberlake
TITLE:	Laboratory Manual for General, Organic, and Biological Chemistry
EDITION:	
PUBLISHER:	Pearson
DATE:	2007
ISBN:	9780805349047
STATUS: (Check one)	☐ IC ☐ 0/0 ☒ R
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R

#2 ADDITIONAL BOOKS TO SUPPORT THIS COURSE: (Specify STATUS at end of each entry.)	
AUTHOR(S):	John McMurry, Mary E. Castellion,
TITLE:	Study Guide and Full Solutions Manual
EDITION:	5th ED
PUBLISHER:	Pearson/Prentice Hall
DATE:	2007
ISBN:	9780131877740
STATUS: (Check one)	☐ IC ☐ 0/0 ☒ R
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R

#2 ADDITIONAL BOOKS TO SUPPORT THIS COURSE (Continued) (Specify STATUS at the end of each entry.)	
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
AUTHOR(S):	
TITLE:	
EDITION:	
PUBLISHER:	
DATE:	
ISBN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R

Append additional page if necessary.

#3 SERIALS: (newspapers, magazines, journals, yearbooks) (Specify STATUS at the end of each entry.) Note that the Library will not be able to subscribe to many new serials. However, the articles from more and more periodicals appear in the Library's electronic full-text databases.	
SERIAL TITLE:	
PUBLISHER:	
ISSN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
SERIAL TITLE:	
PUBLISHER:	
ISSN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
SERIAL TITLE:	
PUBLISHER:	
ISSN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
SERIAL TITLE:	
PUBLISHER:	
ISSN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
SERIAL TITLE:	
PUBLISHER:	
ISSN:	
STATUS: (Check one)	☐ IC ☐ 0/0 ☐ R
TYPE LIBRARY LIASON'S NAME AND OBTAIN INITIALS (#1-3)	Jane Devine

#4 MEDIA ITEMS: (films, videos, cassettes, CDs, DVDs, slide sets, filmstrips, etc.) (Specify STATUS at the end of each entry.)	
TITLE:	
DISTRIBUTOR	
STATUS: (CHECK ONE)	☐ IC ☐ 0/0 ☐ R
TITLE:	
DISTRIBUTOR	
STATUS: (CHECK ONE)	☐ IC ☐ 0/0 ☐ R
TITLE:	
DISTRIBUTOR	
STATUS: (CHECK ONE)	☐ IC ☐ 0/0 ☐ R
TITLE:	
DISTRIBUTOR	
STATUS: (CHECK ONE)	☐ IC ☐ 0/0 ☐ R
Append additional page if necessary.	

TYPE MEDIA LIAISON'S NAME & OBTAIN INITIALS	Albert Neal

Provide the mean or median enrollment in courses offered by the department or program during the last term for which data is available.
25

INFORMATION LITERACY: The proposer and the library faculty have collaborated on plans for the above listed (and other) resources to be used in activities designed to increase student information literacy.	
TYPE NAME OF LIBRARY FACULTY & OBTAIN INITIALS	Jane Devine

SOFTWARE/HARDWARE REQUIREMENTS: (e.g., commercial application package, microcomputer or other special facilities required)

TYPE NAME OF DIRECTOR OF INSTRUCTIONAL SERVICES & OBTAIN INITIALS (only if applicable)	

TYPE PROPOSER'S NAME & OBTAIN INITIALS	Burl Yearwood

APPROVAL PAGE:
For all items below, type in the faculty and department names and obtain the initials for each person listed.

PROPOSER (S)	DEPARTMENT(S)	DATE
Burl Yearwood	Natural & Applied Sciences	

CHAIRPERSON(S) OF DEPT. CURRICULUM COMMMITEE(S)	DEPARTMENT(S)	DATE
Margaret Norris	Natural & Applied Sciences	

DEPT'L. REPRESENTATIVE(S) TO COLLEGE-WIDE CURRICULUM COMMITTEE	DEPARTMENT(S)	DATE
Margaret Norris	Natural & Applied Sciences	

DEPARTMENT CHAIRPERSON(S)	DEPARTMENT(S)	DATE
Ann Feibel	Natural & Applied Sciences	