Marine Biology Research Program
WSEP: Work Skills Employability Profile

Program Description

The Marine Biology Research Program is a 3 yr. program that will jump start high school students in core marine science topics employing hands-on, problem-based learning strategies. Students will begin by building and studying simple aquatic ecosystems; formulate experiments with these systems; learn the biology, chemistry, physics, and ecology behind them; and apply basic instrumentation techniques to monitor them. Once these sets of "in house" skills have been mastered, the program will then shift students' attention to the natural ecosystems around Governor's Island through the formulation of projects around 3 main topics: oyster restoration, habitat characterization, and water/air quality monitoring with a student built and maintained network around the Hudson River Estuary. Students will learn how to formulate projects, submit professional reports, present at national and international research fairs (*e.g.* Intel Science and Engineering Fair), and, ultimately, use their own data to propose resource management solutions to local government agencies. Upon satisfactory completion of this program students will also be eligible for 12 college credits through SUNY Albany and 6 from Manhattan College, a Geographic Information System credential, and the NOCTI Natural Resources Systems credential. All together, Marine Research scholars will have a strong foundation for competitive colleges and the STEM Career Cluster (*i.e.* environmental and marine science, water and waste water management, geographic information systems, and natural resources management.)

Program Objectives

01. Prepare students for resource management and conservation.
02. Give students a strong foundation in marine science.
03. Expose students to professional settings and careers in marine science.
04. Prepare students for college with rigorous research projects and college credit bearing courses.
05. Train students to build and maintain a remote sensing water quality monitoring network.
06. Characterize Governor's Island marine environment.
07. Monitor the oyster restoration project.

Skills Overview	Certifications & College Credit
Personal Characteristics	SPACE Geographic Information Systems Certification
Job Seeking Skills	
Job Keeping Skills	NOCTI Natural Resources Systems Certification
Universal Foundation Skills	NYCSEF Certification
Basic Science	SUNY Albany College Credit
Field Sampling	Manhattan College Credit
Instrumentation	
Data Acquisition & Management	
Physical-Chemical Analysis	
Information Technology + Statistics	
Project Management	
Independent Project Skills	

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THE URBAN ASSEMBLY
New York
HARBOR
SCHOOL

URBAN ECOLOGY
New York
MARINE
BIOLOGY

Name _____ Class of _____

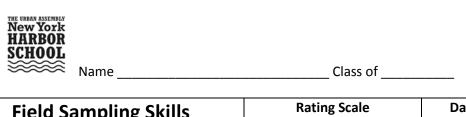| Interpersonal and Job Readiness Skills	Rating Scale **3** Above Average **2** Average **1** Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Personal Characteristics:					
Relations with others (effectiveness in working with students, instructors, and others; cooperation; shows respect)					
Dependability (attendance, punctuality, adherence to schedules and deadlines; consistency and results; perseverance)					
Work Attitudes (willingness to learn; willingness to accept and profit from evaluation; enthusiasm; initiative; commitment; excel in work)					
Communication (listening, speaking, and nonverbal skills; effectiveness in communicating with students; teachers, and others)					
Personal Hygiene/Grooming (personal health care and cleanliness; dresses and maintains self appropriately)					
Job Seeking Skills:					
Visit career sites (*i.e.* Careerzone.com, Monster.com, etc.)					
Create a Career Plan					
Fill out this Skills Employability Competencies List					
Write a resume					
Prepare a job application form					
Write letters of application and acceptance					
Arrange for personal references					
Apply job search techniques (online job search)					
Arrange a job interview					
Apply job interview techniques					
Evaluate job offers (actual or simulated)					
Job Keeping Skills:					
Knowledge of Workplace (Policy and Ethics)					
Response to Supervisor (Accepts direction, feedback and constructive criticism with positive attitude and uses information to improve work performance. Demonstrates flexibility when nature of work changes.)					
Communication Skills (Gives full attention to what other people are saying, asks questions as appropriate and understands what was heard. Communicates concerns clearly and asks for assistance when needed.)					
Solves Problems and Makes Decisions (Identifies the nature of the problem, evaluates various ways of solving the problem and selects the best alternative.)					
Cooperates with Others (Interacts and communicates with others in a friendly and courteous way. Shows respect for others' ideas, opinions and racial and cultural diversity. Effectively works as a member of a team.)					
Resolves Conflicts (Identifies the source of conflict, suggests options to resolve it and helps parties reach a mutually satisfactory agreement.)					
Observes Critically (Carefully attends to visual sources of information. Evaluates the information for accuracy, bias and usefulness. Develops a clear understanding of the information.)					
Takes Responsibility for Learning (Identifies own strengths and weaknesses. Sets goals for learning. Identifies and pursues opportunities for learning. Monitors own progress toward achieving these goals.)					
Complies with Health and Safety Guidelines					

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Lab Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Basic					
Using correct Personal Protective Equipment (PPE)					
Measuring Length with at least 3 different tools					
Measuring Volume with at least 3 different tools					
Measuring Mass with at least 2 different tools					
Germinating seeds hydroponically					
Substrate establishing (*i.e.* flourite, gravel, and/or sand)					
Aeration applications in biology experiments					
Building and maintaining a fresh water non-re-circulating aquatic ecosystem model					
Intermediate					
Understands requirements for Biological Safety Level I					
Disinfecting with chlorine					
Initiating nitrification with ammonia and nitrifying bacteria					
Calculating simple solution concentrations (chemical + biological)					
Building a freshwater re-circulating aquatic ecosystem model					
Maintaining a freshwater re-circulating aquatic ecosystem model					
Neutralizing pH for waste water solutions					
Using an R/O DI filter system					
Advanced					
Understands Biological Safety Levels II and above					
Sterilizing with pressure pot					
Calculating energy flow					
Building and installing manifold					
Building and maintaining a brackish and/or salt water aquatic ecosystem model					
Building or maintaining an R/O DI filter system					

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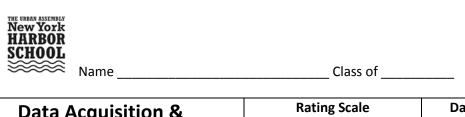| Field Sampling Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	2	1		
Basic					
Water quality sampling with bucket					
Water quality sampling with dipper					
Crab traps					
Minnow traps					
Slide preparation					
Using a manual depth sounder					
Intermediate					
Water quality sampling with Beta Bottle					
Small manual plankton nets					
Benthic grab manual sampler					
Epiphyton sampler					
Transept sampling					
Using a seine net					
Advanced					
Water quality sampling with Niskin Bottle					
Large tow plankton nets onboard vessel					
Benthic sampler onboard vessel					
Quadrat/transept sampling					
Digital transepts					

Name _____ Class of _____

Instrumentation Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	2	1		
Basic					
Maintaining Test Strips					
Using a calibrated stop watch					
Using a calibrated thermometer					
Using magnifying glasses					
Using a manual depth sounder					
Using a manual hanging scale					
Intermediate					
Preparing pH standards					
Calibrating pH sensor					
Using a micropipette					
Folsom Plankton Splitter					
Maintaining an Electrical Conductivity probe					
Measuring mass with a digital balance					
Using a light microscope without immersion objective lens					
Using a light stereoscope					
Using a sonar depth sonde					
Using a flow meter					
Using a digital scale					
Using light and/or temperature sensors					
Keeping an instrument calibration log					
Keeping an instrument maintenance log					
Advanced					
Using a digital microscope with immersion oil					
Using a digital stereoscope					
Maintaining optical probes (*e.g.* dissolved oxygen, chlorophyll)					
RS232 Communication protocol with sensor					
Replacing probes on meters (Hanna Combo and YSI)					
Replacing filters for CO2 detection					
Calibrating a LICOR CO2 sensor					
Running a MetOne Particulates sensor					
Running a Magee Scientific Aetholometer Black Carbon sensor					

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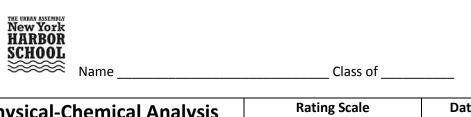New York
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Name _____ Class of _____

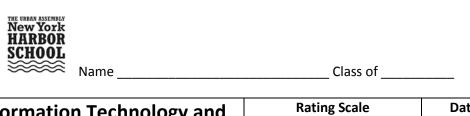| Data Acquisition & Management Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Basic					
Creating a data table with metadata section using a word processor or digital spread sheet					
Using a picture key to identify organisms					
Using a data table to collect qualitative data					
Using a data table to collect quantitative data - counts					
Intermediate					
Creating a dichotomous key to identify organisms					
Using a dichotomous key to identify organisms					
Creating digital images with digital microscope/stereoscopes					
Inputting and managing data in a spread sheet					
Log of missing data					
Log of data entry and transcription errors					
Log of protocol errors					
Advanced					
Creating identification fiches for organisms					
Determining data precision					
Determining data bias					
Determining data representativeness					
Determining data comparability					
Determining data completeness					
Determining instrument sensitivity					
Managing a website with project data.					

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Physical-Chemical Analysis Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Basic					
Measuring ammonia concentration using Aquacheck colorimetric test					
Measuring pH using Aquacheck colorimetric test					
Measuring nitrite concentration using Aquacheck colorimetric test					
Measuring nitrate concentration using Aquacheck colorimetric test					
Measuring buffering capacity using Aquacheck colorimetric test					
Measuring phosphate concentration using Aquacheck colorimetric test					
Measuring hardness using Hach colorimetric test					
Measuring alkalinity using Aquacheck colorimetric test					
Measuring temperature with a calibrated thermometer					
Intermediate					
Measuring salinity with a refractometer					
Measuring pH with a conductivity probe					
Measuring electrical conductivity with a conductivity probe					
Measuring turbidity with a turbidity tube or Secchi disk					
Measuring current with meter tape, floating device, and chronometer					
Adjusting pH levels of a solution					
Measuring nutrients using photometer					
Adjusting nutrient levels (hydroponics germination)					
Advanced					
Measuring dissolved oxygen using the Azide modified Winkler Method					
Measuring enterococcus using Enterolert					
Measuring nutrients using a spectrophotometer					
Measuring dissolved oxygen using optical probe					
Measuring chlorophyll a using optical probe					

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Information Technology and Statistics Skills	Rating Scale **3** Above Average **2** Average **1** Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Basic					
Turning on and shutting down a computer correctly					
Naming digital files					
Creating and naming digital folders					
Organizing a USB thumb drive					
Data table creation					
Basic statistics (digitizing data on to Microsoft Excel, central tendency)					
Digitizing data on to Microsoft Word					
Search queries on the internet					
Google Earth – Basic functionality					
Intermediate					
Graphing in Microsoft Excel					
Experimental design (problem definition, hypothesis/null hypothesis formulation, objective definition, variable definition, controls, constants, assumptions, limitations, replicating, pseudoreplicating, task definition, materials definition, protocol definition)					
Intermediate statistics (probability, regression analysis, correlations)					
Boolian logic for internet search engines					
Google Earth – Intermediate functionality*					
ArcGIS – Basic and Intermediate functionality					
Bluetooth technology for remote data transfer - telemetry					
Parametric Statistics - error types					
Parametric Statistics - t-test, and/or Chi square test					
Advanced					
Parametric Statistics – ANOVA and or ANCOVA					
ArcGIS software – Advanced functionality for geographic information processing					
Primer + Permanova applications for non-parametric ecological statistics					
Phylogenetic Tree software					
Spip4q application for automated instrument data retrieval					
Hyperterminal application for remote instrument communication					
Radio technology for remote data transfer - telemetry					
Cell phone technology for remote data transfer - telemetry					

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Project Management Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	**2**	**1**		
Basic					
Science report writing					
Keeping a basic research journal					
Organizing a research portfolio					
Literature review					
Basic bibliography writing skills					
Active note taking (*i.e.* style and unknown word definition)					
Presentation skills in front of class audience					
Creating a procedures flow chart					
Creating a materials list					
Intermediate					
Active note taking strategies (*i.e.* inquiry questions, reading conditions)					
Keeping a professional science journal					
Keeping an updated research portfolio					
Cornell and Harvard style notation					
Writing a Research Plan					
Obtaining and keeping open communication with a professional scientist as an advisor or mentor					
Technical reading and summarizing of peer reviewed journal articles					
Technical writing (Introduction, Background, Materials, Procedures, Results)					
APA style bibliography writing					
Application process for science enrichment programs					
Presentation skills in front of school wide audience					
Preparing a digital presentation					
Creating a materials budget					
Ordering project materials					
Advanced					
Technical writing (Analysis and Conclusions)					
Writing a journal article style paper					
Research Fair application					
Travel preparations					
Presentation skills in front of regional wide audience					
Preparing a poster board					

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Independent Research Project Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors/Mentors Initials
	3	**2**	**1**		
Basic					
Intermediate					
Advanced					

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Miscellaneous Skills	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	2	1		
Financial Management:					
Identify positive/negative money habits					
Difference between needs and wants					
Defining SMART goals					
Making DECISIONS					
Defining income and expenses (graphs)					
Creating a spending plan or budget					
Creating and keeping a money management action plan					
Other:					

Work-Based Learning Experience, Certifications & College Credit	Rating Scale 3 Above Average 2 Average 1 Below Average			Date Evaluated	Instructors Initials
	3	2	1		
Total # of CTE Coursework Hours					
Total # of WBL Experience Hours					
Final Total # of Hours					
Total # of SUNY Albany College Credit					
NOCTI Natural Resource Systems Certification					
SPACE Geographic Information Systems Certification					
NYCSEF Certification (or other regional accredited Science & Engineering Fair Certifications)					

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To whom it may concern,

The purpose of this letter is to confirm that the above named student has been evaluated for the skills outlined in this document. Next to each competency skill you'll find the proficiency level that said student achieved during their course in the Marine Biology Research Program, academic classes at the Urban Assembly New York Harbor School, other enrichment opportunities, and Work-Based Learning Experiences. Below you will find the names and contact information of those persons that have evaluated the holder of this document.

_____   _____
Print Name: **Print Name:**
Company: **Company:**
Title: **Title:**
Contact: **Contact:**

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Print Name: **Print Name:**
Company: **Company:**
Title: **Title:**
Contact: **Contact:**

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