HUNTER COLLEGE
SCHOOL OF EDUCATION

CHEM 660 Challenging Concepts in Chemistry PGEOG 660 Challenging Concepts in Earth Science PHYS 660 Challenging Concepts in Physics BIOL 660 Challenging Concepts in Biology	4 Credits

Instructor: Prof. Stephen DeMeo   (aka Dr. D.)
Email: sdemeo@hunter.cuny.edu

Required Texts:
1. "Million Dollar Data: Building Confidence – Vol.1" by S. DeMeo (pdf at Google Play)

2. "Million Dollar Data: Respecting Uncertainty – Vol.2" by S. DeMeo
      (I will provide this pdf; go to Dropbox, enter sdemeo@hunter.cuny.edu and use
      password, hunterdropbox1)

Goggles; bound notebook; lab coat is an option

Class Time: Friday 4:00 – 8:00pm	Room: HW 705
Office Hours: Before and after class, by appointment	

Course Description:
This course will allow teacher-candidates to develop multi-day hands-on science activities in the context of Science, Technology, Engineering, and Mathematics (STEM). We will examine 1) how to rigorously collect data that is based on confidence and uncertainty indicators, 2) use mathematics, statistics, laptops, and cell phones to collect and analyze data, 3) implement novel ways of keeping a laboratory notebook, writing lab reports, and making poster presentations. The chosen activities will also allow students to understand key concepts in the content areas of biology, chemistry, earth science, physics, and engineering. Experience with these activities, especially a focus on engineering and statistics, will meet the new Next Generation Science Standards (NGSS) recently adopted by New York State.

Assignments
1. On a weekly basis, students will be grouped into teams and will participate in discussions based on the readings assigned on the previous week.

2. Students' notebooks will be examined periodically to determine if the correct format is being followed. At the end of the term students will hand in xeroxed pages from their lab notebook that corresponds to a completed experiment. The excerpt must follow the format presented in class.

3. All experiments will require grouped students to make Lab Report PowerPoint presentations following the X-SIT format. The presentations will follow a Communicate, Defend, Revise structure. Revised lab reports will be individually handed into me for a grade.

Grading

1. Participation (reading, doing Powerppoints, revisions)	30%	90-100%	A/A-
2. Observation of a Candle / Mineral Oil	5%	80-89%	B+/B/B-
3. Lab Notebook Format Check	15%	70-79%	C+/C/C-
3. Individual Lab Report as Powerpoint Presentations	50%	60-69%	D
		0-59%	F

Week to week topics with assignments (subject to change)

Documents will be found at dropbox. (sdemeo@hunter.cuny.edu; pw: hunterdropbox)

Session 1
- What is Truth? What is scientific truth?
- Syllabus
- Download text books: Confidence and Uncertainty discussion
- Creation of quiz teams
- Fake News and Truth making in Science
- Video: Reasons to Believe
- The Scientific Method; the School Scientific Method
- Authentic science learning environments
- Communication: lab notebook, posters, lab reports
- **Observation of a candle/mineral oil and water**
- **Ball throwing**
- **DeMeo's Rules for Repetition**
- **HW: Buy a non-spiral notebook and goggles**
- **Read: Confidence 1&2**

Session 2
- 100 Observations due
- Show notebooks
- **Rules for good notebook keeping (Ref: Uncertainty Chapter ?)**
- Problems with the traditional pre/lab/post lab format
- **The Gold Foil Experiment**
- The 12 Confidence Indicators
- Assigning of Poster presentation groups (x students / 3 or 4 = number in each group)
- **Read: Confidence 3**

Session 3
- Take out notebooks
- **1. Two Different Salts – Using the Confidence Indicators**
- The Traditional Lab Report vs the Powerpoint report
- Lab report due next week will follow Powerpoint format in book
- **Read: Confidence 4**
- **Bring in Jelly Beans!!!**

Session 4
- **Powerpoint presentation (lab report) on Salt experiment**
- **2. Jelly Bean experiment**
- How to measure
- Dispersion of data (frequency distribution chart)
- Best Value: Mean, median or mode
- Other ways to measure?
- Ideas for your project
- **Read: Uncertainty 1-2**

Session 5
- **Powerpoint on jelly beans**
- **3. Earth Science activity: TBA**
- **Read: Confidence 6&7**

Session 6
- **Powerpoint on earth science activity**
- **4. Density experiment**
- **Read: Uncertainty 3**

Session 7
- **Powerpoint on density experiments (multiple groups)**
- Notebook check
- **5. Calculation of g constant by accelerometer, free fall of an object, and pendulum**
- **READ:**

Sesson 8
- **Calculation of g constant continued**
  READ:

Sesson 9:
- **6. Zinc and Iodine reaction**
- **READ:**

Sesson 10:
- **Zinc and Iodine reaction continued**
  READ:

Session 11:
- **Powerpoint of zinc and iodine**
- **Read in-class: Engineering paper handout**
- Engineering vs Science
- How to Design: The Ideo Video
- **Making a catapult (no lab report)**
- **READ:**

Session 12
- **7. Chemical Boat Engineering Project – 1st Run**
- **READ:**

Session 13
- **Chemical Boat Engineering Project continued – Redesign**
- **Race**
- **READ:**

Session 14
- **Powerpoint on Chemical Boat**
- Student verbal abstracts demonstrating their Confidence and Uncertainty experiment
- **READ:**

Session 15
- How to use Confidence and Uncertainty with different age groups
- Revisiting Authenticity, Siloed Curricula vs Vertical Alignment
- What is Fake News and how to tell what is scientifically true
- The Seven Commandments of Fake News; NY Times Video
- Individual Powerpoint experiments uploaded to my dropbox.

<u>Class Policies:</u>
1. Class Participation: Since this is a constructivist-based class where meaning is generated in class as well as outside the classroom, your participation in discussions is very important. Therefore, read the assigned chapters or articles before class and be prepared to ask a question or make a comment. Grading papers or performing unrelated work while in class will not be tolerated.
2. Student presentations must be completed on assigned dates; a deduction in grade will be imposed if a student does not concur.
3. Please notify me immediately if you require any special adaptations to meet the requirements of this course. Arrangements can be made to accommodate a variety of needs to ensure the success of all students.
4. Attendance to all class meetings is required. I will accept 2 absences. On the third, your grade is lowered by 2/3 of a letter grade. On the fourth absence, you have to retake the course. There are no exceptions. Illness and parent-teacher nights are built into the allowed absences. I will allow students to recover 1 absence by doing an independent project that is mutually agreed upon.
5. Incompletes will only be given for major medical reasons.
6. All assignments must be completed to pass the course.
7. If plagiarism is proven, it will result in an F and/or an F in the course.
8. Lateness: If you are over half an hour late to class it counts as ½ of an absence; if you leave half an hour or more before the end of the class it also counts for ½ of an absence.
9. Please do not use your laptops or cell phones for anything that does not directly pertain to the present lesson. No surfing the Internet, no personal calls, no doing day job work. The second warnings will result in a lowering of your final grade by one letter grade.

<u>Academic Integrity</u>
Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

It also resolved, "that the faculty at Hunter College are encouraged to use commercial and non-commercial devices to prevent and detect some forms of plagiarism and to educate and promote student commitment to academic integrity."   One commercial product that is available to faculty is Turnitin.com. If you choose to use this product or any other instrument, then the students in your classes must be so informed. Several issues with respect to copyright and other legal questions have been raised by students and faculty. Many of these issues are addressed in the Turnitin.com website http://www.turnitin.com/. Click on "Legal" and then "U.S. Legal Document". To view the entire Hunter College Academic Integrity Policy and Procedure, please go to the Hunter College Senate homepage at http://www.hunter.cuny.edu/senate/ and click on "Documents". If you have any questions about college policies and procedures concerning academic integrity, please contact the college's academic integrity officer, Dean Michael Escott: extension - x4876 or e-mail: michael.escott@hunter.cuny.edu.

<u>Expectations for Written Proficiency in English</u>
Students must demonstrate consistently satisfactory written English in coursework. The Hunter College Writing center provides tutoring to students across the curriculum and at all academic levels. For more information, see http://rwc.hunter.cuny.edu. In addition, the School of Education offers a reading/writing workshop during the semester to students who need additional work honing their reading and writing skills. To register for this course, students must obtain permission either from the Chair of Curriculum & Teaching or the Associate Dean.

Office of AccessABILITY. In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions.
It is recommended that all students with documented disabilities (emotional, medical, physical and/ or learning) consult the Office of AccessABILITY located in Room HE1124 to secure necessary academic accommodations. For further information and assistance please call (212-772-4857)/ TTY (212- 650- 3230). **You must be registered with the Office of AccessABILITY to qualify for the accommodations.**

b.   Hunter College Policy on Sexual Misconduct. In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students,

employees, or visitors, as well as certain intimate relationship. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a.   Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444)

b.   All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (**jtrose@hunter.cuny.edu** or **212-650-3262**) or Colleen Barry(**colleen.barry@hunter.cuny.edu** or **212-772-4534**)

and seek complimentary services through the Counseling and Wellness Services Office, Room HE 1123.

The CUNY Policy on Sexual Misconduct Link
is: http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf

Hunter College Conceptual Framework

Preparation of reflective, knowledgeable and highly effective teachers, counselors, and administrators

Evidence–Based Practices

The School of Education grounds its course content in the best field-based research and practice. Faculty review findings from their respective disciplines to provide our candidates with the strategies needed for effective instruction. Our candidates master the theory and practice of effective pedagogy in their subject areas, and acquire the tools for reflection on and improvement of their professional work. They achieve a solid foundation in the history, philosophy, psychology, sociology and methodology of education that enriches their teaching. Candidates gain expertise in analyzing and using assessment of student performance to guide their instruction and create optimal learning environments for students.

Integrated Clinical Experiences

The School of Education ensures that its candidates understand and experience the realities of school contexts. We establish strong connections with partnering schools in New York City and surrounding areas. We provide extensive fieldwork with supportive supervision in these schools. Our candidates engage in carefully sequenced and comprehensively assessed clinical experiences prior to their graduation

Educating a Diverse Student Population

The School of Education provides its candidates with the critical skills and understanding necessary to be responsive to the multiple challenges of all learners: students with a wide range of backgrounds, cultures, abilities and prior knowledge. We teach candidates to create humane and ethical learning communities in their classrooms and schools. They gain the ability to collaborate successfully with parents, families, community members, school faculty and staff in order to provide this support.

Use of Technology to Enhance Learning

The School of Education prepares candidates with the practical and theoretical knowledge of effective and judicious uses of technology in a variety of school settings and for a broad spectrum of learners. Formative and summative assessments of our candidates' technology competencies are a critical component of preparing them for tomorrow's schools. We believe that appropriate uses of educational technology enhance learning, assessment and communication.

Integration of Conceptual Framework:
    Evidence-Based Practices: Innovations in laboratory curriculum design
    Integrated Clinical Experiences: Migration of select topics into the field
    Educating a Diverse Student Population: Cooperative learning laboratory groups
    Use of Technology to Enhance Learning: PowerPoint, Internet, Probeware