

FCSC-101 Improvements & Assessment

by Ana G. Petrovic

Assistant Professor of Chemistry & Content Coordinator of FCSC-101

Foundations of Scientific Process (FCSC-101) is a recently developed course within the NYIT's revamped Core Curriculum, which aims to: a) provide students with a richer perspective to the world, b) encourage student-inspired scientific explorations and, c) foster an interest in science. The course has been developed with intention to modernize the educational experience of our students. To achieve this objective, the course diverges from the mold of a traditional science course in two manners: it is both interdisciplinary and interactive.

Since the time the course has been instituted in the Fall of 2010, the interdisciplinary nature of the course has been realized by integrating 5 scientific disciplines: 1) Astronomy, 2) Chemistry, 3) Earth Science, 4) Genetics, 5) Evolution. The disciplines are not covered separately (autonomously), but throughout the course of the semester, the interdependencies are made "visible" to students through discussions, activities and demonstrations. For example, when covering Astronomy unit we demonstrate that the Chemistry unit plays an indispensable role in understanding the motion of planets, stars and galaxies by considering the atomic line spectrum. Similarly, understanding the direction of motion of the objects in the universe requires understanding and utilization of the Doppler Shift phenomenon, which is one of the fundamental concepts of classical Physics. Additionally, the knowledge-base provided by the Astronomy unit regarding the changes of Earth's orbit relative to the Sun is necessary in considerations of factors that determine Global Climate and govern Climate change, which are topics considered in Earth Science unit.

In summary, each unit is interrelated to other units via concrete examples and hands-on activities. Based on students input and participation in class discussions, we have assessed that FCSC-101 course fully reaches the objective of demonstrating that science, regardless of the discipline, is no longer done in "vacuum" and that interdisciplinary approach is nowadays a powerful intellectual force needed for progress and growth of scientific knowledge.

Additionally, the interdisciplinary aspect of the course is made "visible" to students via discussions that account for the fact that each of the disciplines has a goal to bring humanity to a closer understanding of nature around us, from microscopic to macroscopic scale. We discuss with students that each discipline is interested in observing, recognizing patterns and predicting the future of systems that surround us. The only difference between the disciplines is the scales within which different disciplines operate: Astronomy reflects curiosity about macroscopic scale, Earth Science reflect curiosity about human scale, Chemistry reflects curiosity about microscopic scale.

Even though the interdisciplinary and interactive aspects of the class have been satisfied in the past deliveries/implementations of the course (since Fall 2010), a recently developed/ adopted scientific literacy assessment instrument indicates areas that have room for improvement. The specific area that was recognized in need for growth and improvement relates to students' comprehension of the scientific process and its relevance. On the initiative of Dean Yu, Summer Institute has been organized with team of 9 faculty members (Dean Dr. Roger Yu, Dr. Nicholas Bloom, Dr. Ana Petrovic, Dr. Eleni Nikitopoulos, Dr. Joby Jacob, Dr. Vinh Pham, Dr. Ana Lucia Fuentes, Dr. Francine Glazer and Dr. Yuko Oda) to address the need for making the scientific process more "visible" and concrete to both students as well as instructors teaching the course. The following 3 major changes have been made to insure more optimal integration of scientific process within the curriculum:

- 1) Six initial lectures have been devoted solely to the topic of what science is and how scientific process is conducted (regardless of the scientific discipline). We believe that these initial lectures provide a solid footing for students' understanding of the scientific process and enhancing their ability to recognize it and engage in it.
- 2) Throughout the curriculum, for each of the disciplines covered, power-point slides are introduced that provide discussion-opportunities and hands-on-activity opportunities that demonstrate the scientific process. These slides are presented to "fuel" in-class discussion regarding how scientific process is used in a particular discipline to advance the understanding of the nature.
- 3) Each week, lectures begin with outline and review of the key concepts covered in the previous lecture. Each week's lecture ends with outline and review of the key concepts covered in class as well as summary of the demonstrated scientific process "in action".

With the above described improvements, we believe that future assessment would demonstrate an even more successful implementation of the FCSC course with regards to students' active learning and satisfaction.