- **Course Number and Title:** CHEM 1215G. General Chemistry I Lecture and Laboratory for STEM Majors
- **Catalog Description:** This course covers descriptive and theoretical chemistry.
- **Credit Hours:** 4 Credits (3+3P)
- **Prerequisite(s) / Corequisite(s)** Prerequisite(s): MATH 1215G or equivalent Mathematics Placement Exam Score
  Corequisite(s): None
- **Required:** Required for BSME and BSAE Degrees
- **Course Availability:** Fall and Spring Semesters (+ Summer)
- **Instructor (Usual):** Dr. Nicholas G. Beltran
- **Textbook:** Zumdahl, Zumdahl and DeCoste, Chemistry, An Atoms First Approach, 3rd edition, Cengage
- **Course Learning Objectives:** <u>After completing this course, a student should be able to:</u>
  1) Apply critical thinking to chemical concepts.
  2) Use quantitative reasoning to solve chemical problems.
  3) Appreciate their personal and social responsibility as it applies to chemical topics.
- **Topics Covered:**
  1) Use dimensional analysis, the SI system of units and appropriate significant figures to solve quantitative calculations in science. Understand the differences between physical and chemical changes to matter. Classify types of matter.
  2) Understand the scientific method in the context of scientific discoveries.
  3) Explain the structure of atoms, isotopes and ions in terms of subatomic particles.
  4) Analyze how periodic properties (e.g. electronegativity, atomic and ionic radii, ionization energy, electron affinity, metallic character) and reactivity of elements results from electron configurations of atoms.
  5) Understand the creation of different types of compounds (ionic and molecular), comparing and contrasting their structures, naming schemes and formulas. Apply knowledge of electronic structure to determine molecular spatial arrangement and polarity.
  6) Understand bulk pure substances, their properties and their states of matter by understanding and identifying intermolecular forces. Apply kinetic molecular theory to relate atomic level behavior to macroscopic properties. Introduce the mole and

apply the mole concept to amounts on a macroscopic and a microscopic level

7) Understand mixtures, solubility by considering intermolecular forces and expressing concentration in molarity.
8) Identify different reaction types. Apply the law of conservation of mass to reactions. Perform stoichiometry on balanced reactions.
9) Demonstrate and apply concepts associated with laboratory safety, including the possible consequences of not adhering to appropriate safety guidelines.
10) Demonstrate the computational skills needed to perform appropriate laboratory related calculations to include, but not be limited to determining the number of significant figures in numerical value with the correct units, solving problems using values represented in exponential notation, solving dimensional analysis problems, and manipulating mathematical formulas as needed to determine the value of a variable.
11) Perform laboratory observations (both qualitative and quantitative) using sensory experience and appropriate measurement instrumentation (both analog and digital).
12) Prepare solutions with an acceptable accuracy to a known concentration using appropriate glassware.
13) Master basic laboratory techniques including, but not limited to weighing samples (liquid and solid), determining sample volumes, measuring the temperature of samples, heating and cooling a sample or reaction mixture, decantation, filtration, and titration.
14) Draw conclusions based on data and analyses from laboratory experiments.
15) Relate laboratory experimental observations, operations, calculations, and findings to theoretical concepts presented in the complementary lecture course.