

## WTCS Repository

10-806-134 General Chemistry

# Course Outcome Summary

### Course Information

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|  | Description | Covers the fundamentals of chemistry. Topics include scientific method, problem-solving using quantitative, characteristics of matter, periodic relationships of elements, chemical bonding, chemical reactions, chemical equilibrium, analysis of chemical substances, characteristics of aqueous solutions, acids, bases, and gas laws. |
|  | Total Credits | 4 |

Pre/Corequisites

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| Prerequisite | Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College. |

### Course Competencies

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| 1. | Perform safe laboratory practices |
|  | Assessment Strategies |
|  | 1.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 1.1. | use PPE |
|  | 1.2. | follow laboratory procedures |
|  | 1.3. | locate critical safety equipment |
|  | 1.4. | select the correct equipment for specific procedures |
|  | 1.5. | locate regulatory guidelines related to the laboratory chemicals |
|  | 1.6. | follow laboratory safety procedures |
| 2. | Apply scientific method |
|  | Assessment Strategies |
|  | 2.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 2.1. | apply the steps in the scientific method to problems |
|  | 2.2. | draw conclusions from your observations and/or data |
|  | 2.3. | record quantitative observations |
|  | 2.4. | record qualitative observations |
| 3. | Solve problems using quantitative data |
|  | Assessment Strategies |
|  | 3.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 3.1. | use various systems of measurements |
|  | 3.2. | convert within and between systems of measurement |
|  | 3.3. | write numbers using appropriate significant figures |
|  | 3.4. | apply significant figure rules to rounding |
|  | 3.5. | convert between standard and scientific notation |
|  | 3.6. | distinguish between accuracy and precision |
|  | 3.7. | use dimensional analysis |
|  | 3.8. | calculate derived properties |
| 4. | Explain the characteristics of matter |
|  | Assessment Strategies |
|  | 4.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 4.1. | distinguish between physical vs chemical properties |
|  | 4.2. | distinguish between physical vs chemical changes |
|  | 4.3. | distinguish between homogenous and heterogeneous mixtures |
|  | 4.4. | distinguish among the physical states of matter |
|  | 4.5. | identify changes in physical states of matter |
|  | 4.6. | distinguish between mixtures and pure substances |
|  | 4.7. | distinguish between compounds and elements |
|  | 4.8. | contrast the properties of ionic and molecular compounds |
|  | 4.9. | describe intermolecular forces |
| 5. | Analyze the periodic relationships of the elements |
|  | Assessment Strategies |
|  | 5.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 5.1. | predict periodic trends |
|  | 5.2. | describe the basic structure of the atom |
|  | 5.3. | describe the properties of subatomic particles |
|  | 5.4. | determine the number of subatomic particles in atoms and/or ions |
|  | 5.5. | identify all parts of the isotopic symbol |
|  | 5.6. | relate isotopic symbol to subatomic particle composition |
|  | 5.7. | classify elements by their position on the periodic table |
| 6. | Describe chemical bonding |
|  | Assessment Strategies |
|  | 6.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 6.1. | determine valence electrons for main group elements |
|  | 6.2. | apply the octet rule to chemical bonding |
|  | 6.3. | explain the formation of an ionic bond |
|  | 6.4. | use a periodic table to predict ions formed by main group elements |
|  | 6.5. | explain the formation of a covalent bond |
|  | 6.6. | use the periodic table to determine an element's bonding patterns |
|  | 6.7. | relate electronegativity differences between atoms to the type of bond they form |
|  | 6.8. | draw molecular structures |
| 7. | Explain the behavior of matter during a chemical reaction |
|  | Assessment Strategies |
|  | 7.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 7.1. | identify evidence of a chemical change |
|  | 7.2. | determine the impact heat has on chemical processes |
|  | 7.3. | describe chemical reactions using equations |
|  | 7.4. | classify types of reactions |
|  | 7.5. | relate experimental observations to chemical changes |
| 8. | Calculate quantities of substances |
|  | Assessment Strategies |
|  | 8.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 8.1. | apply mole concepts |
|  | 8.2. | convert between moles and particles |
|  | 8.3. | calculate molar mass |
|  | 8.4. | balance chemical equations |
|  | 8.5. | solve stoichiometry problems |
|  | 8.6. | convert between moles and grams |
| 9. | Analyze chemical substances |
|  | Assessment Strategies |
|  | 9.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 9.1. | explain the law of constant composition |
|  | 9.2. | use chemical formulae to represent compounds |
|  | 9.3. | differentiate between ionic and molecular compounds |
|  | 9.4. | interpret ionic and molecular compounds from the formula or the name |
|  | 9.5. | apply rules of chemical nomenclature |
|  | 9.6. | change between chemical names and formulae |
|  | 9.7. | identify the seven elements that exist naturally as diatomic molecules at room temperature |
| 10. | Characterize aqueous solutions |
|  | Assessment Strategies |
|  | 10.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 10.1. | identify the components of a solution |
|  | 10.2. | solve concentration problems |
|  | 10.3. | calculate the molar concentration of a solution |
|  | 10.4. | describe properties of solutions |
|  | 10.5. | apply solubility rules |
| 11. | Analyze acid-base chemistry |
|  | Assessment Strategies |
|  | 11.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 11.1. | distinguish between the properties of acids and bases |
|  | 11.2. | characterize acid-base reactions |
|  | 11.3. | interpret the pH scale |
|  | 11.4. | calculate the pH of a solution |
|  | 11.5. | explain buffers |
| 12. | Characterize the behavior of gases |
|  | Assessment Strategies |
|  | 12.1. | Oral, Written, Graphic and/or Skill Assessment |
|  | Criteria |
|  | 12.1. | use the kinetic molecular theory to describe behavior of gases |
|  | 12.2. | use appropriate units of measure for state variables |
|  | 12.3. | apply the gas laws to solve problems |
|  | 12.4. | describe relationships between state variables |