**Warren County School District**

**PLANNED INSTRUCTION**

# COURSE DESCRIPTION

**Course Title:** **Advanced Chemistry (Honors)**

**Course Number:** 00333

**Course Prerequisites:** Successful Completion of Academic Chemistry or permission of the principal

**Course Description:** (Include "no final exam" or "final exam required")
Advanced Chemistry provides able and motivated students with the opportunity to pursue college-level chemistry studies while still in high school. This rigorous preparatory course is designed for students who will study chemistry or a related field at the college level. Advanced Chemistry is a one-year, one-credit honors course. Topics include: crystallography, ideal gases, nuclear chemistry, thermodynamics, quantum mechanics, bonding and coordination chemistry, as well as career exploration within the field of chemistry.

**Suggested Grade Level:** 12

**Length of Course:** _____ One Semester __X__ Two Semesters _____Other (Describe)

**Units of Credit:** 1 (Insert ***NONE*** if appropriate.)

**PDE *Certification and Staffing Policies and Guidelines (CSPG)* Required Teacher Certification(s)** (Insert certificate title and CSPG#) _____

**Certification verified by WCSD Human Resources Department:**
_____ Yes _____ No

**Board Approved Textbooks, Software, Materials:**
**Title:**
**Publisher:**
**ISBN #:**
**Copyright Date:**
**Date of WCSD Board Approval:**

**BOARD APPROVAL:**

**Date Written:** November 2009

**Date Approved:** _____

**Implementation Year:** 2010-2011

**Suggested Supplemental Materials:**

## Course Standards

**PA Academic Standards:** (List by Number and Description)

**3.1 Unifying Themes**

12B Apply concepts of models as a method to predict and understand science and technology.

12C Assess and apply patterns in science and technology.

**3.2 Inquiry and Design**

12B Evaluate experimental information for appropriateness and adherence to relevant science processes.

12C Apply the elements of scientific inquiry to solve multi-step problems.

**3.4 Physical Sciences, Chemistry and Physics**

12A Apply concepts about the structure and properties of matter.

12B Apply and analyze energy sources and conversions and their relationship to heat and temperature.

**4.3 Environmental Health**

12A Analyze the complexity of environmental health issues.

12B Analyze the local, regional and national impacts of environmental health.

**WCSD Academic Standards:** (List or **None**)

None

**Industry or Other Standards:** (List, Identify Source or **None**)

None

## WCSD EXPECTATIONS

WCSD K-12 Expectations for instruction in writing, reading, mathematics and, technology have been developed and revised annually. The teacher will integrate all WCSD Expectations into this planned instruction.

## SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP) or Gifted Individual Education Plan (GIEP).

## SPECIFIC EDUCATIONAL OBJECTIVES/CORRESPONDING STANDARDS AND ELIGIBLE CONTENT WHERE APPLICABLE

(List Objectives, PA Standards #'s, Other Standards (see samples at end))

This course is written to the 12th grade standards. No assessment anchors have been written for this level.

## ASSESSMENTS

**PSSA Assessment Anchors Addressed**: The teacher must be knowledgeable of the PDE Assessment Anchors and/or Eligible Content and incorporate them into this planned instruction. Current assessment anchors can be found at pde@state.pa.us.

No assessment anchors are available for this course. See above.

**Formative Assessments:** The teacher will develop and use standards-based assessments throughout the course.

**Portfolio Assessment:** _____ Yes __X__ No

**District-wide Final Examination Required:** _____ Yes __X__ No

**Course Challenge Assessment** (Describe):

## REQUIRED COURSE SEQUENCE AND TIMELINE

(Content must be tied to objectives)

| Content Sequence | Dates |
|---|---|

A. Gases **15 days**
1. Avogadro's Hypothesis
2. Molar volume
3. Ideal Gas Law
4. Gas reaction Stoichiometry

B. Limiting reactants **10 days**

C. Solids **20 days**
1. Crystal systems
2. Unit cells
3. Closest packing
4. Semiconductors
5. Liquid crystals
6. Amorphous substances
7. Hydrates

D. Nuclear chemistry **20 days**

1. Types of radiation
3. Elementary particles
4. Quark theory
5. Balancing nuclear equations
6. Decay and half-life
7. Nuclear reactions
    a. Fission
    b. Fusion

E. Thermodynamics **20 days**
1. Enthalpy
2. Entropy
3. Free energy

F. Oxidation-reduction **20 days**
1. Oxidation
2. Reduction
3. Balancing Redox equations

G. Electrochemistry **20 days**
1. Electrolytic conduction
2. Metallic conduction
3. Electrolysis
4. Voltaic cells
5. Nernst equation

H. Quantum-mechanical model of the atom **15 days**
1. Bohr atom
2. De Broglie's Hypothesis
3. Heisenberg Uncertainty Principle
4. Schrodinger's Wave Equation
5. Quantum numbers
6. Pauli Exclusion Principle

I. Molecular structure **20 days**
1. VSEPR
2. Atomic orbital overlap
3. Hybridization
4. Resonance
5. Molecular orbitals

J. Coordination Chemistry **20 days**
1. Nomenclature
2. Coordinate covalent bonds
3. Ligand Field Theory

K. Laboratory **Time: Throughout course**

**Objectives:**

1. Evaluate scientific processes by collecting data and applying knowledge to physical models to interpret data.
2. Assess and apply patterns in equilibrium systems, nuclear reactions, and the structure of matter.
3. Evaluate the atomic theory.
4. Evaluate data correctly for conclusions.
5. Characterize matter in terms of its structure and properties.

**WRITING TEAM:** Sue Hutchins, Charles Hayes

**WCSD STUDENT DATA SYSTEM INFORMATION**

1. Is there a required final examination? __X__ Yes _____ No
2. Does this course issue a mark/grade for the report card?

   __X__ Yes _____ No
3. Does this course issue a Pass/Fail mark? _____ Yes __X__ No
4. Is the course mark/grade part of the GPA calculation?

   __X__ Yes _____ No
5. Is the course eligible for Honor Roll calculation? __X__ Yes _____ No
6. What is the academic weight of the course?

   _____ No weight/Non credit _____ Standard weight

   __X__ Enhanced weight (Honors) As per current school board policy.