Southern Victoria High School
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Phone: 273-4762 13 School Street, Perth-Andover NB E7H 4T4 Fax: 273-4765

Chemistry 122

Teacher: Mr. Christopher McLaughlin **Course Time:** Period 3
Classroom location: B212 **E-mail:** Chris.McLaughlin@nbed.nb.ca

Course Requirements: A mark of at least 65% in Chemistry 111/112 is strongly recommended.

COURSE DESCRIPTION
The Chemistry 122 course is an upper level college preparatory course which emphasizes the concepts of energy, equilibrium, matter, systems and models as they relate to biology. The program emphasizes the impact of biology and technology on society. Students must be able to demonstrate an understanding of the major concepts that will be covered. They need to demonstrate an understanding of the interrelationships among science, technology and society. They also need to demonstrate the skills and thinking processes associated with the practice of science.

COURSE OBJECTIVES / OUTCOMES

Unit 1: Thermochemistry *(23 hours)*

1. Introduction to Thermochemistry *(4 hrs)*
   The relevance of thermochemistry is introduced with the investigation of calorimetry to analyze food products. Alternative fuel energies are investigated with respect to non fossil-fuel combustion.
   - Thermochemistry STSE
   - Science Decisions

2. Enthalpy *(14 hrs)*
   Identify and calculate energy changes associated with phase changes. The construction of heat curves and the analysis of its individual components are explored both qualitatively and quantitatively. A lab reinforces this concept through construction of a basic calorimeter.
   - Enthalpy Changes
   - Thermochemistry Experimentation

3. Bonding and Hess' Law *(5 hrs)*
   Theoretical enthalpy is calculated using Hess' law for instances where practical applications cannot be applied.

Unit 2: From Solutions to Kinetics to Equilibrium *(15 hours)*

1. Kinetics and Rate of Reaction *(3 hrs)*
   Factors affecting the rates of reaction relating to kinetics are investigated.

2. Collision Theory, Reaction Mechanisms and Catalysts *(3 hrs)*
   Collision theory and Le Chatelier's principle are used in predicting the direction of reactions.

3. Chemical Equilibrium *(9 hrs)*
   Calculating equilibrium constants is used in predicting the direction of reactions.

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Unit 3: Acids and Bases *(23 hours)*

1. Properties and Definitions of Acids and Bases *(4 hrs)*
   Using various models (Arrhenius, and Brønsted-Lowry), students learn the various characteristics, properties and behaviors of acids and bases. The limitations of the Arrhenius Theory are identified. Individual ion concentrations are calculated based on dissociation equations.

2. Acid/Base Reactions *(4 hrs)*
   The Bronsted-Lowry Theory is explored in detail. Acids, bases, conjugate acid-base pairs and amphoteric substances are identified. Students learn to predict the products of acid-base reactions by using a table of acid-base strengths.

3. OH^-, H_3O^+ and Le Chatelier *(3 hrs)*
   The self-ionization of water and Kw is introduced. Illustrate the use of indicators and Le Chateliers Principle in action.

4. Using the Equilibrium Concept with Acids and Bases *(7 hrs)*
   Perform calculations of pH, pOH, $[OH^-]$, $[H_3O^+]$ using Kw. Identify strong acids and bases. Identify weak acids and bases, define % dissociation and perform calculations using Ka and Kb. Calculate the equilibrium concentrations, pH and/or pOH of various species using initial concentrations and the equilibrium constant. (ICE problems)

5. Acid/Base Titrations *(5 hours)*
   Titrations are used to reinforce empirically, the rationale of why acids and bases behave as they do. Interpret a variety of titration curves with weak and strong, acids and bases and with mono and polyprotic acids. Select the appropriate indicator for various titrations. Use titration curves or data to predict the pH of various household substances.

Unit 4: Organic Chemistry *(24 hours)*

1. So Many Compounds *(3 hrs)* Students investigate the large number of organic compounds that result from the unique nature of carbon. Students practice building and illustrating some of these compounds.

2. Influences of Organic Chemistry on Society *(1 hr)* Natural and synthetic compounds are discussed with respect to their influence on society.

3. Classifying Organic Compounds *(2 hrs)* Compounds are classified into various families by virtue of their functional groups and structures.

4. Naming and Writing Organic Compounds *(5 hrs)* Students will name limited numbers of alkanes, alkenes, alkynes, aromatics, alkyl halides, alcohols, carboxylic acids, esters, ethers, aldehydes and ketones. Naming is demonstrated using IUPAC rules.

5. Isomers in Organic Chemistry *(2 hrs)* Students will illustrate and name structural and geometric isomers of various organic compounds.

6. Applications of Organic Chemistry *(2 hrs)* Students investigate how science and technology contributes to the production of more commercially viable products. An appropriate example of this is oil refining with its incorporation of fractional distillation, cracking and reforming.

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7. Writing and Balancing Equations *(4 hrs)* Complete, balance and classify selected organic reactions. Draw the structural diagrams of all the reactants and products. Include addition, substitution, esterification, combustion, cracking and reforming.

8. Polymerization *(1 hr)* The process of polymerization is described (addition and condensation) and some important natural and synthetic polymers are identified.

9. Organic Experimentation *(2 hrs)* Design and perform an experiment. Students could synthesize an ester, aspirin & nylon.

10. Risk and Benefit of Organic Chemistry: STSE Perspectives *(2 hrs)* Students could research the risks and benefits of various synthesized organic compounds. (Cfc's, PCB's, DDT & BPA)

COURSE EXPECTATIONS (Role of student)
In order to be successful in Chemistry 122, in addition to completing assignments, **homework (30 minutes/night)** and projects, you will need to bring the following to class each day: textbook, calculator, pencil and notebooks (binder for day to day work).

COURSE TEXTBOOKS AND MATERIALS
Text: Prentice Hall Chemistry
Required Materials:

- Pencils, pens, and erasers
- Binder with lined paper, graph paper and dividers
- Ruler
- Scientific or Graphing Calculator
- Google E-mail account

Mark Distribution:	**Midterm Grade**	**June Grade**	**Final Grade**
	70% Class Work	60% Class Work	40% Midterm Grade
	30% Midterm Exam	40% Final Exam	60% June Grade

INTERNET SITES

Blog:	http://svchemistry.edublogs.org
Edmodo	http://www.edmodo.com
School Site:	http://svhs.nbed.nb.ca/

EXTRA HELP PLAN
I will be available by appointment at noon hour or after school. Please note that my supervision schedule will impact my availability during noon hour and after school.

Note: Policies regarding deadlines, plagiarism, procedures, routines, classroom expectations, attendance, exemptions, homework, etc. are posted on the school website.

Student Name: _____ Student Signature: _____

Parent Signature: _____ Parent E-mail: _____

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