OFFICIAL SYLLABUS
CHEM101: Introductory Chemistry I
Section 20F (CRN# 44528) &
Section 21F (CRN# 44259)

THREE CREDIT HOURS
(Four Contact hours: 2 Class + 2 lab)
SPRING, 2017

Tuesdays, 1:00 PM - 4:50 PM (20F)
Wednesdays, 6:00 PM – 9:50 PM
Anderson 60th Street
Class: Room 216  Lab: Room 215

DR. JERRY E. SIPE
CELL: 765-623-7072
(jsipe6@ivytech.edu) (usually checked daily)
Availability on Campus: M (9-5 PM),
Tu (9-12 PM) & W (12-5 PM) by Appointment
Course Web Site
http://faculty.ivytech.edu/~bsipe/CHEM101/
Also accessible through Blackboard 9

EFFECTIVE DATE: 01/17/17
This syllabus is subject to change on one week’s advance notice. The syllabus posted on the course website is the official syllabus of the course.

SCHOOL: Liberal Arts and Sciences
PROGRAM: Natural Sciences

Anderson Campus
815 East 60th Street
Anderson, IN 46013
765-643-7133

CATALOG DESCRIPTION: An introductory course that includes the science of chemistry and measurement, atomic theory and the periodic table, chemical bonding, equation writing and balancing, stoichiometry, gases, and acids/bases.

PREREQUISITES: MATH 118 Concepts in Mathematics or MATH 123 Quantitative Reasoning or demonstrated competency through appropriate assessment or earning a grade of “C” or better in MATH 035 Fundamentals of Algebra II or MATH 043 Essentials of Algebra II or MATH 100 Intermediate Algebra and ENGL 093 Introduction to College Writing and ENGL 083 Reading Strategies for College or ENGL 095 Integrated Reading and Writing

I. COURSE CONTENT AND OBJECTIVES
   A. Topical areas of study in class will include
      Measurement and calculations
      Chemical foundations I: Elements, atoms, and ions
      Chemical reactions: Introduction
      Chemical reactions: In aqueous solutions
      Introduction to acids and bases
      Chemical quantities
      Chemical foundations II: Modern atomic theory
      Gases

      Introduction to chemistry
      Matter and energy
      Nomenclature
      Chemical reactions: Classification
      pH and pOH
      Chemical compositions
      Chemical bonding
      Stoichiometry

      Chemical safety
      SI measurements
      Families of elements
      Stoichiometry
      Chemical reactions
      Chemical bonding

      Physical properties
      Chemical properties
      Acids and bases
      Empirical formulas
      Gas laws
      Use of chemistry glassware & equipment

   B. Topical areas of study to be included in the laboratory:

   C. MAJOR COURSE LEARNING OBJECTIVES (Relevant Chapters): SEE APPENDIX A
II. A GUIDE TO SUCCESSFUL COMPLETION OF THIS COURSE

A. Attendance (ABS) Policy: Any absence from class and lab is a hindrance to the successful completion of this course. If you’re going to be successful in this course you must be present every class session every hour of the session. The truth is that no class session can be completely made up. Whatever makeup work is done will not make up for the session missed with the instructor and your classmates. Thus, even one absence has the potential to lower your final grade. Given the clear correlation between class attendance and student success, the East Central Region has developed the following standards in order to emphasize the importance of class attendance:

1. Students attending 100% of class sessions in their entirety will be awarded one percentage point (10 course points) extra credit in recognition of this achievement. For the purposes of this credit, there will be no excused absences. This extra credit is already entered into your course grade book and will immediately disappear with the first absence.

2. You must be present for the whole class period and lab period to be counted present for that day. Students missing 25% of scheduled classes (4 complete class sessions) will receive an automatic F (FA) grade in the course; these students will be encouraged to continue to attend and participate in the course for financial aid reasons. Students will be warned by Ivy Advising as follows: (1) when two absences occur, (2) when three absences occur and (3) will be notified of the automatic F by the instructor on the fourth absence. I recommend that if you have a documented excuse (e.g. doctor's note or billing) that you present it to the instructor on the day you return to class. Students who are assigned a failing grade because of their lack of attendance and who believe that an extraordinary circumstance caused an absence may appeal the fourth absence directly to the department chair, Professor Nancy Risner (nrisher1@ivytech.edu ). The appeal must be in writing (email message is acceptable) with supporting documentation and made within one week of the email notice from the instructor. Students should continue to attend the course and complete course requirements during the appeal process.

   In the case of student absence from class, it is the responsibility of the student to contact the instructor to arrange acceptable make-up work if appropriate. Extreme situations that cause absence such as illness and death in the family will be considered in the instructor’s decision. Some absences even carry automatic point penalties (See each assignment type in Section IV for details). POGIL points missed because of an absence cannot be made up; however, opportunities to make up other points missed may be possible.

   Attendance will be taken at every class session. Absences and partial will be reported in each online unit and final grade report in the ABS columns of the report. Student attendance is reported to the Registrar periodically for auditing purposes. Some students may be required to repay part of their Financial Aid, including the Pell Grant, if these audits show poor attendance as defined by the registrar.

   As important as attendance is, it is not enough. You must be present in mind as well as body. I expect you to be prepared for all class sessions. Some of the assignments (e.g. the reading assignments and crossword puzzles) are designed to prepare you for each chapter; other assignments are used for reinforcement and assessment. Almost all of the homework assignments are listed on the schedule and you are expected to complete them by the due date. It is best to arrive early for class since the reading quizzes are often administered at the beginning of class period.

3. WITHDRAWAL PROCESS: Students in or applying for allied health professional programs can take a course twice. A withdraw and an F counts as one of these times. The highest grade recorded will become the grade for that course. To withdraw from this class, you must complete a change of registration form, and submit it to the Registrar’s Office before the last Day to Withdraw, April 15th, 2017. This process can be completed online for your convenience.
Dropping a course is an important decision. Standards of Academic Progress (SAP) require that students maintain a 2.0 GPA and a 67% completion rate. Withdrawing from a course ensures that your GPA will not be adversely affected; however, withdrawing from a course may cause you to fall under the 67% completion rate that is required. The effect on your financial aid status is dependent upon your own individual circumstance. Before you take any action, please contact your faculty advisor and/or the financial aid department to clarify the impact for you. The best course of action is to continue in the course and pass with a satisfactory grade but if this is not realistic, it is your responsibility to research your options and make an informed decision.

B. Ask Questions: Successful students ask questions about things they don’t understand. This is the most efficient way to use the instructor. Asking a question maximizes your learning because it directly addresses your need. So, ask questions in class frequently. I will address each and every question posed either in class or after class.

C. Read Assigned Material: Get involved with the text material. Read the assigned material before the class session in which it will be covered. You may need to read the material several times. Highlight ideas and concepts you believe to be important. If you have a question about what you’re reading, write it in the margin of the page and ask the question in class. You might try outlining the chapter. Get some of the classmates together (perhaps before class) and quiz each other about things you don’t understand.

D. Think about the Material. Spend time thinking about (studying) the assigned material. Time spent thinking about the course concepts is essential to understanding the concepts of the course. The assignments are designed to aid in this thinking process. Make sure that you think as you work through them. Many students study better with friends, but you should also reserve some private study time for yourself to help prepare for the individual exams and quizzes. Study at regular intervals; for a 4 contact hour class like ours, 8 to 10 hours a week (1 to 2 hours a day) outside of class is usually adequate. Find a quiet calm place to study. For private study, the library is a good choice.

E. Use Course Resources. Course resources include texts, notes, etc but they also include classmates, tutors, and the instructor. By making friends with your classmates, you improve your social skills, enlarge your people network, find study partners, and make the class more enjoyable. Your classmates may explain some things in ways that you understand better than the instructor's approach. Tutoring is another course resource. There is tutoring available and a current tutoring schedule will be posted online when it becomes available. Don't wait too long if you're having any trouble. If you would like to work with a tutor, contact the Academic Support Center on your campus. But don’t fail to use the recourse you paid for - ask the instructor for help. Reference books and the internet are additional sources the student may consider.

III. TOOLS AVAILABLE TO ASSIST LEARNING

A. Required Course Materials
3. Other than Text
   a. Safety goggles
   b. Appropriate protective clothing for the laboratories (can be purchased through the bookstore).
   c. A scientific calculator.
B. Course Web Site
1. There is a web site for this course: http://faculty.ivytech.edu/~bsipe/CHEM101/. This web site can also be accessed by a link located on Blackboard. This website is not connected to Blackboard and so does not go down when Blackboard does.
2. It is my intent that you check this site frequently, i.e., 3-4 times per week. Website features include the following:
   a. The official copy of the syllabus; this will not be changed without at least a week notice. Any changes made will be posted immediately and becomes the current operating syllabus.
   b. The official copy of the course schedule; the schedule will be changed periodically when needed to accommodate unexpected delays or closures. All changes will be made to the website copy and it then becomes the official schedule.
   c. Class announcements.
   d. Important Semester Dates such as the final day to drop the course.
   e. Access to crossword puzzles, lab assignments and other course assignments.
   f. Posting of test scores
   g. Periodic grade/point summaries
   h. Links to various other web sites of interest to fledgling chemists

C. The Text: The text will serve as our guide through this chemical world. I plan to stick close to the text in sequence and content (see class schedule for details). The text serves as a topic reference source for the course; i.e. to provide comprehensive coverage over the various concepts studied.

D. Class Sessions: The class sessions will consist of three basic activities that I believe will facilitate your learning of the text material and allow some feedback as to how you are progressing in the mastery of the course content:
1. POGIL Lessons (PG)(100 Points): These are the main instructive devices used in the course. POGIL stands for Process Oriented Guided Inquiry Learning. This is a small group instructional program in which the students are guided by prepared materials to discover the basic concepts of beginning chemistry. Each POGIL exercise details the group role in which each member functions. These roles are defined in Appendix B of the syllabus. In our first session together you will be introduced to the reasons why I decided to move into this mode of instruction for most of the major concepts. Points in this category cannot be made up if missed because of the group experience nature of the instruction.

2. Participation Points (PT) (100 Points): These items provide an opportunity to test your knowledge and get immediate feedback, with little grade penalty. These are reinforcement opportunities that must be turned in or completed on the day they are listed on the schedule or assigned in class. Any participation items that are turned in late can earn a maximum of 20% of their value regardless of reason for the absence. The rational for this rule is that there are 200-300 points offered in this category and I believe that your time would be better spent working on current assignments. The most important items in this category are the crossword puzzles (CW) because these are the only reinforcement items for the vocabulary of each chapter. Other items in this category include homework assignments (AS), pop quizzes (PQ, MQ), instructional games (GM) and in-class practice exercises (PT). Most of the participation items will be worth 5 points.

3. Lecture/Discussion (LD): Oh, yes, some of these sessions will use the familiar lecture format designed to highlight important facts and concepts, to provide an opportunity of further exposure to the more difficult material and to address individual questions. But even in these sessions, I hope that at least some of the time you will join me in discussion of the material.
E. Chapter Problems (CHP) (150 Points): The function of this type of open book homework assignment is twofold: a) to reinforce the content of each chapter and b) to prepare you for the unit tests and the final exam multiple choice question format. These chapter problems are accessed and graded via Blackboard and can be attempted up to three times for maximum credit. The class schedule indicates the optimal time these items are due; however, they can be completed anytime before the in-class unit test. After this time, they can no longer be accessed.

F. Tests (TST) (280 Points): Four unit tests are planned for the course. These tests are given in two parts: The first part is a take-home component containing mostly problems designed to utilize the principles of the unit. The second part, an in-class component, is designed to test vocabulary and mostly general concepts and principles. This semester all the tests will have the same value (70 points). Up to 15% of each test may be used to revisit material from previous units; the other 85% of the test will deal with the information processed in the specific unit. The score for each test will be the sum of the points earned in each part. Makeup tests may be allowed if there is a reason that justifies (in the opinion of the instructor) the absence. The makeup must be completed on Mondays through Wednesdays 9:00 AM – 5:00 PM by appointment only on the 60th street campus. Other makeup times might be available on request. In either case, the student must make an appointment by Email and will be given instructions on where the test will be taken. The instructor reserves the right to revoke these makeup privileges if planned and/or fraudulent abuses are detected.

G. The laboratory (LAB) (120 points): I believe that the primary function of the laboratory is to introduce students in the proper use of experimentation to learn and report knowledge. In the laboratory experiments that you will participate in, you will learn to assimilate the attitude and behavior of a laboratory investigator: one in charge of experimental design, implementation and analysis. It is a time to learn the skills and attitudes required for good scientific investigation. Unfortunately it is just too difficult and expensive to provide makeup opportunities for the lab work. Therefore, there may not be an opportunity to make up the lab if missed; this will be entirely at the discretion of the instructor.

The lab grade is determined by two factors: the execution of the lab itself and the lab reports. The execution of the lab is determined from the raw data collected and turned in by the group recorder with each member of the group getting the same score. The execution grade is generally determined by the accuracy, precision of the measurements collected by the group and/or whether or not the lab was completed. All labs will require a reporting devise (LR or MLR). There are two types: (1) some will require only the Group Recorder Form and/or end of lab questions used to report and interpret the data collected in the lab or mini lab report – usually a one paragraph summary of the experiment. These are referred to as Mini-Lab Reports (MLR). (2) Two labs require a formal lab report (LR); the general format for the formal lab reports as well as an example of a formal lab report that would earn maximum credit can be accessed from the course website. The date each lab report is due is posted on the schedule; however, all lab reports can be submitted at any time up to an including week 15 (the week before the final exam) for full credit.

H. Final Exam (FE) (250 Points): This final exam will consist of multiple choice questions and the test is accumulative in nature covering material from class as well as labs. Items on the test will be similar to the multiple choice questions on the end of chapter problems and the in-class tests you will take throughout the semester. The final exam is worth at least 250 points; however, it could be worth more: If your final exam grade exceeds your test average, I will substitute the final exam grade for the test average. These bonus points will be included in the points earned by the final exam. This means that you have the opportunity to improve your final grade right up to and including the final exam. The final exam can be made-up by special arrangement with the instructor if the student has the proper documentation for being absent.
I. Extra Credit (EC) (Maximum of 60 points): There are THREE ways you can earn extra credit…
1. Attending every class session (10 points, see Section II.A). If there is an absence all of these points are lost and cannot be made up as there are no excused absences for this extra credit.
2. Taking the syllabus quiz (this is worth 5 points).
3. You can earn up to 50 points extra credit (45 if you do the syllabus quiz) by completing the various class participation opportunities offered throughout the semester. These extra credit points begin to accumulate once you have earned the required 100 participation points.

IV. DOCUMENTATION OF YOUR PROGRESS - THE GRADING SYSTEM
A. Summary of Graded Items: Table 1 presents a summary of graded items and their point value. It also relates the weight of each type of item for the course.

Table 1. Item Point Summary

<table>
<thead>
<tr>
<th>DEVISE DESCRIPTION</th>
<th>NUMBER</th>
<th>TOTAL VALUE</th>
<th>PERCENT GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>POGIL Lessons(^1)</td>
<td>20</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Participation(^2)</td>
<td>Variable</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Chapter Problems(^3)</td>
<td>10-15</td>
<td>150</td>
<td>15</td>
</tr>
<tr>
<td>Tests(^4)</td>
<td>4</td>
<td>280</td>
<td>28</td>
</tr>
<tr>
<td>Labs(^5)</td>
<td>10-12</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>Final Exam(^6)</td>
<td>1</td>
<td>250</td>
<td>25</td>
</tr>
<tr>
<td>EXTRA CREDIT Variable</td>
<td>1</td>
<td>60</td>
<td>6</td>
</tr>
</tbody>
</table>

\(^1\)These items cannot be made up if absent. \(^2\)These items can be turned in late for 20% of starting credit. \(^3\)These items cannot be made up after due date. \(^4\)These items must be made up by appointment Monday through Wednesday, 9 AM to 5 PM. \(^5\)Labs may or may not be made up depending on the nature of the lab; however, you can complete for full credit all lab reports by obtaining a copy of your group’s raw data and complete the rest of the report on your own. Lab reports should be submitted as scheduled but can be submitted any time up to and including the 15th week for full credit. \(^6\)This exam must be made up by arrangement with instructor within the week of the final exam.

B. The grading Scale: Table 2 presents the grading scale for the course in terms of the average rate of accumulation and the final point accumulation for the final letter grade.

Table 2. Relationship of Letter Grades to Percent Scores and Final Point Accumulation

<table>
<thead>
<tr>
<th>LETTER GRADE ON GAB</th>
<th>LOWEST % SCORE FOR LETTER GRADE</th>
<th>TOTAL POINTS REQUIRED FOR LETTER GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90</td>
<td>900-1000</td>
</tr>
<tr>
<td>B</td>
<td>80</td>
<td>800-899</td>
</tr>
<tr>
<td>C</td>
<td>70</td>
<td>700-799</td>
</tr>
<tr>
<td>D</td>
<td>60</td>
<td>600-699</td>
</tr>
<tr>
<td>F</td>
<td>&lt;60</td>
<td>&lt;600</td>
</tr>
</tbody>
</table>

V. OTHER IMPORTANT POLICIES
A. If the Campus is Closed by Weather or Other Conditions: There may be a time when the chancellor of the university issues a statement that classes on campus have been canceled (meaning that students are not expected to attend class that day) or the campus has been closed (no one is expected on campus).
On a very rare occasion the instructor may cancel class. **None of these declarations mean that you have been relieved of the responsibility of the class materials and/or exercises scheduled for that day just as I have not been relieved of the responsibility of delivering the instruction.** As soon as possible after the class closure is announced (no longer than 24 hours after the closure) I will arrange an on-line alternative for the class(s) missed. The curriculum for this on-line session will be delivered via Blackboard and/or the course website. You can access the Blackboard site through a link from the course website or through Campus Connect. A summary of the on-class curriculum will be delivered via Email. **The assignments and activities must be turned in as directed by the instructor or an absence will be entered for that day and there will be no makeup possibility for the assignments.**

B. **Academic Honesty Statement:** The College is committed to academic integrity in all its practices. I value and expect intellectual integrity and a high standard of academic conduct. Activities that violate academic integrity undermine the quality and diminish the value of educational achievement. Cheating on papers, tests or other academic works is a violation of College rules. No student shall engage in behavior that, in the judgment of the instructor of the class, may be construed as cheating at this institution. This may include, but is not limited to, plagiarism (use of direct quotes if not placed in quotation marks regardless of whether or not the source is sited) or other forms of academic dishonesty such as the acquisition without permission of tests or other academic materials and/or distribution of these materials and other academic work. This includes students who aid and abet as well as those who attempt such behavior.

Plagiarism: Presenting within one’s own work the ideas, representations, or words of another person without customary and proper acknowledgment of that person’s authorship is considered plagiarism. Students who are unsure of what constitutes plagiarism should consult with their instructors. Claims of ignorance will not necessarily excuse the offense.

**Plagiarism** can take many forms and can be a punishable offense in any case. Some of the most common examples of plagiarism are the following:

1. Copying or excerpting work from a source and giving no credit to the original author. *For instance, if a student takes parts of a text (often cut and pasted from an internet source) and uses it to construct a research paper with no in-text citations or bibliographic page, the student is committing plagiarism.*
2. Willfully submitting an unchanged paper written in one class for credit in another class. *(Self-plagiarism)*
3. Buying, borrowing or sharing an assignment of any kind written by another person and turning it in as your own work.

The maximum penalty for the first act of academic dishonesty will be subtraction of the points the item is worth from the total point accumulation. Any further acts of dishonesty will result in a higher penalty that may include an expulsion from class and an F for the semester. In any case a report of the incident(s) will be placed in the student’s permanent record. Institutions to which students seek admission may request information about incidents of academic dishonesty from a student’s record.

C. **Copyright Statement:** Students shall adhere to the laws governing the use of copyrighted materials. They must insure that their activities comply with fair use and in no way infringe on the copyright or other proprietary rights of others and that the materials used and developed at Ivy Tech Community College contain nothing unlawful, unethical, or libelous and do not constitute any violation of any right of privacy.
D. ADA STATEMENT: Ivy Tech Community College seeks to provide effective services and accommodations for qualified individuals with documented disabilities. If you need an accommodation because of a documented disability, you are required to register with Disability Support Services at the beginning of the semester. If you will require assistance during an emergency evacuation, notify your instructor immediately. Look for evacuation procedures posted in your classrooms. Disability Support Contact Information for each campus is as follows:

- Muncie and New Castle – Lois Weiss 765-289-2291 ext 1388, lweiss1@ivytech.edu
- Anderson campus – Patricia Toombs 765-643-5745 ext 1076, ptoombs@ivytech.edu
- Marion campus – Brian Sprayue 765-651-3111 ext 3311, bsprayue@ivytech.edu

E. Student Appeal/Grievance Process: Students who are experiencing difficulties/conflict in this class need to speak with me FIRST. If we cannot come to a mutual understanding, students may submit their concerns in writing to Mr. Mark C. Robins (mrobbins@ivytech.edu), Assistant Chair of the Department of Natural Sciences – Anderson. If a resolution cannot be reached at this level, an appeal may be directed to the Chair of Department Natural Sciences, Professor Nancy Renee Risner (nrisner1@ivytech.edu). If warranted, a final appeal may be made to the Dean of the School of Liberal Arts and Sciences, Mr. Neil Anthony (nanthony@ivytech.edu). Following this hierarchy is required. Students who fail to follow this procedure will be sent back to the appropriate level before their particular issues will be heard at a higher level. Further details on this procedure can be found in the Student Handbook. The College’s updated Code of Student Rights and Responsibilities was available via the College’s Webpage (www.ivytech.edu). The “Code” is located in the footer of the page under the “About” column and labeled “Student Rights.”

F. Emergency Reaction Policies: There may be times when the class receives word to lockdown and/or evacuate the building. If one of these situations occurs, all students should stop talking, listen for directions from the instructor and execute them promptly and accurately. The following is to let you know the general procedure for each of our class venues:

1. Classroom (216):
   a. Lockdown: A student sitting close to the door will make sure that the classroom door is closed and locked (if possible) and the lights turned off. All students should gather as close to the instructor’s podium as possible and sit on the floor until an all-clear or evacuation order is received.

   b. Evacuation: When the instructor receives the order to evacuate, he will approach the door, open it carefully and assure that it is safe to exit. The instructor will then give the order to the class to evacuate and indicate the first person to leave. The rest of the class will follow single file. To reach the nearest exit you will need to turn right after passing through the door, turn right again and go down the stairs, and finally turn right and exit through the east exit. Once out of the exit door, proceed to the end of the east parking lot. The class will remain there until dismissed by the instructor.

2. Lab (215):
   a. Lockdown: A students sitting close to the doors should make sure that the classroom doors are closed and the lights turned off. All students should collect in the rear of the room next to the wall the door is on.

   b. Evacuation: When the instructor receives the order to evacuate, he will check the exit route and indicate the first person to leave; the rest of the class will follow in single file. The leader should go through the door, proceed diagonally to the stairs, turn right at the bottom and exit through the east exit. Once out of the exit door, proceed to the end of the east parking lot. The class will remain there until dismissed by the instructor. Remain in a group until dismissed by instructor.
G. COUNSELING SERVICES: Ivy Tech Community College has partnered with the Ball State Practicum Clinic to provide Ivy Tech students with the tools to meet their personal and educational goals. They are able to assist with many issues, including healthy relationships, stress reduction, anxiety, suicide prevention, and student development. All Ivy Tech students receive three FREE counseling sessions either on Ivy Tech’s Cowan Road campus or Ball State’s campus. If students would like to continue counseling beyond three sessions, each 50 minute session is $10. To schedule an appointment, students should send an email to Dr. Mary Lewellen, Assistant Vice Chancellor of Student Affairs at mlewelle@ivytech.edu.
APPENDIX A
MAJOR COURSE LEARNING OBJECTIVES (Relevant Text Chapters):

Upon successful completion of this course the student will be able to:

1. Measure with S.I. (Systeme Internationale) units of length, volume and mass. *(1, LAB)*
2. Perform mathematical calculations using scientific notation. *(1, MTB 1.1 & 1.2)*
3. Distinguish between accuracy and precision of measurement. *(LAB)*
4. Solve mathematical problems using dimensional analysis. *(1, MTB 1.3)*
5. Differentiate among electrons, protons, and neutrons and describe how they affect the properties of elements. *(2)*

6. Explain the differences between the common states of matter in terms of visible properties and particle movement. *(1,9,10)*
7. Distinguish between elements, compounds, homogeneous mixtures and heterogeneous mixtures. *(1)*
8. Describe the periodic table in terms of element arrangement in periods, groups, and subshell blocks. *(1,7)*
9. Describe modern atomic theory. *(2, 7)*
10. Describe the electron configurations of elements, determine the number of valence electrons for all representative elements, write Lewis Structures for the representative elements and simple compounds. *(7, 8)*

11. Distinguish between ionic and covalent bonding. *(8)*
12. Describe the different types of intermolecular forces. *(10)*
13. Given the name (or formula) of a compound, write the formula (or name) of that compound. *(3)*
14. Given the mass (or moles) of an element or compound, calculate the moles (or mass) of that element or compound. *(6)*
15. Calculate the concentration of a solution in terms of percent and molarity. *(4, 11)*

16. Classify chemical reactions into one of the three major groups (synthesis, oxidation-reduction, and exchange). *(5)*
17. Balance a chemical equation by inspection. *(5, 14)*
18. Describe the properties of acids, bases, and salt. *(13)*
19. Determine simple pH and pOH. *(13)*
20. Calculate mass relationships in chemical reactions by using stoichiometry. *(6, 11)*

21. Calculate the change in pressure, volume, or temperature of a gas using the appropriate gas law. *(9)*
22. Use common types of chemical glassware, equipment, and chemicals safely and appropriately. *(LAB)*
23. Describe and illustrate chemical principles in laboratory situations.
24. Obtain reproducible data from chemical experiments; analyze, interpret, and communicate the data in a logical and coherent manner. *(LAB)*
25. Recognize uncertainties in data and identify potential sources of error. *(LAB)*
Appendix B
POGIL GROUP MEMBER ROLES

Each member of a POGIL group will have a specific function or role to play in each exercise in addition to completing the assigned work. These roles will be systematically assigned at the beginning of each POGIL exercise so that all members will have equal opportunity to serve in each role. These roles and their responsibilities are described below:

1. **Group Manager (MAN):** This is the management roll of the group. This person begins each session by taking charge of the group folder and handing out required materials for the session. He/she shall ensure that each of the team members is fulfilling their assigned role. This person is in charge of keeping the group discussion going and on track. The manager must work with the reflector to manage the time according to the time line on each POGIL exercise. The group manager must ensure that all members of the group get the opportunity to contribute and handle diplomatically and with sensitivity conflicts of opinion and fact when they arise. If a member fails to take part in group activities, the manager should notify the instructor. Finally, the manager is responsible for collecting the **Group Response Form (GRF)** from the Recorder and the **Reflector Response Form (RRF)** from the Reflector and placing these forms in the left pocket of the POGIL folder.

2. **Recorder (REC):** This position is the secretary of the group. The recorder keeps track of the names of group members and the roles that they have been assigned for the day. The recorder should pay particular attention the group discussion and fill in their responses with the group consensus. At the end of the exercise, the recorder attaches the **Group Response Form** to her/his POGIL exercise and makes sure this record is returned to the manager complete and on time.

3. **Reporter (RPT):** Responsible for sharing group conclusions with other groups, reports to the class, or with the instructor. Unless otherwise stated, the instructor will respond to group questions only through the reporter. The reporter also assists the manager in keeping the discussion productive and encouraging each member of the group to be active in solving the problem.

4. **Reflector (REF):** The primary job of the reflector is to monitor the progress of the group through the exercise. The reflector keeps a page by page record of the progress of the group by recording on the **RRF** the time each page of the exercise is completed by the group. Finally, the reflector summarizes his/her opinion as to the effectiveness of their learning of the material by filling out Section 3 of the **RRF**. The reflector is responsible for completing the RRF and giving it to the manager after the exercise is completed.
5. **Technician (TEK):** When this role is detailed, the person will be the only person in the group allowed to use calculator and/or computer. This person may be responsible also for instructing the group in the use of these devices. When designated, this role will be assigned as a second role to one of the members in the group. On other exercises this role will not be detailed; in this case any member of the group may feel free to use these tools.

6. **Encourager (ENC):** acknowledges the good ideas and insights of group members and group as a whole. Most of the time, this role will be assigned as a second role to one of the members in the group. This does not lessen the importance of this role but is an acknowledgment that this function is important enough and different enough to be intentionally assigned. Someone has to be the cheerleader of the group – it’s the role of the encourager to be that person.

7. **Sigfig and Unit Checker (SFUC):** This person makes sure that all final answers to calculations are to the correct significance and have the proper units.