# Center for Talent Development
# Northwestern University
# Course Syllabus

## Gifted LearningLinks Program

### Course Title: Chemistry Honors

### Course Description:

Learning Links Chemistry Honors is an introductory course covering topics equivalent to a full year of high school chemistry at the honors level. The content within Chemistry Honors is organized into five units:

- Unit One: Introductory Concepts in Chemistry (Chapters 1-5)
- Unit Two: Chemical Compositions and Reactions (Chapters 6-9)
- Unit Three: Energy and Bonding (Chapters 10-12)
- Unit Four: States of Matter, Reactions and Electrochemistry (Chapters 13-18)
- Unit Five: Advanced Chemistry Applications (Chapters 19-21)

The laboratory exercises both reinforce and elaborate on key topics and require simple household/scientific supplies for completion.

**Outcomes**: Upon successful completion of this course, students will be able to:

- solve quantitative chemistry problems and demonstrate reasoning clearly and completely.
- integrate multiple ideas in the problem solving process, and check their results to make sure they are physically reasonable.
- employ critical thinking and hypothesis-driven methods of scientific inquiry.
- clearly explain qualitative chemical concepts and trends.
- describe, explain, and model chemical and physical processes at the molecular level in order to explain macroscopic properties.
- perform basic laboratory techniques correctly using appropriate safety procedures.
- analyze the results of simple laboratory experiments, evaluate sources of error, synthesize this information, and express it clearly in written laboratory reports.
- develop effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.
- work collaboratively in teams through online discussion boards and virtual meetings.

## Resources and Materials:

- World of Chemistry by Zumdahl, Zumdahl, and DeCoste, Houghton Mifflin Co., 2007 (all classes after Sept '09)). **ISBN-10: 0618562761**
  - OR 2002 (optional for classes prior to Sept. '09): **ISBN: 0618134964**
- Supplemental labs and activities – found on blackboard site
- Online Lab Experiments through www.latenitelabs.com - user id/pin sent by instructor
- Students will need a scientific calculator and some basic chemistry lab supplies (beakers, graduated cylinders, etc.) Many supplies can be substituted for, but it is recommended that students take inventory and look through the experiments early in the course to determine what is needed for purchase.

## Schedule:

| SEMESTER ONE | | | | |
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| | **Topic/Focus** | **Activities & Reading Assignments** | **What do I need to post to the Discussion Board?** | **What do I need to turn in?** |
| **Week 1** | Orientation to Online Learning | | Introduce yourself on the discussion board (v2.0 Chemistry Student Lounge). | 1) Interest Survey |
| **Week 2** | Introduction to Chemistry | Read Chapter 1 | Reply to the Chapter 1 Prompt in the v2.0 Chemistry Discussion Questions Forum. | For practice (no need to turn in): Chapter 1 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 1 Homework quiz on Blackboard.<br><br>2) Perform "Identifying an Unknown Substance" Lab through www.latenitelabs.com. Submit your lab report via email upon completion. |
| **Week 3** | Matter | Read Chapter 2: | Reply to the Chapter 2 Prompt in the v2.0 Chemistry Discussion Questions Forum.<br><br>Data/Observations from Household Chemistry lab (found on Blackboard) | For practice (no need to turn in): Chapter 2 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 2 Homework quiz on Blackboard.<br><br>2) Lab: Household Chemistry. Submit all necessary work. |

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| **Week 4** | | | | |
| **Week 5** | Chemical Foundations | Read Chapter 3 | Reply to the Chapter 3 Prompt in the v2.0 Chemistry Discussion Questions Forum. | For practice (no need to turn in): Chapter 3 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 3 Homework quiz on Blackboard.<br><br>2) Perform "Law of Definite Proportions" Lab through www.latenitelabs.com. Submit your lab report via email upon completion. |
| **Week 6** | | | | |
| **Week 7** | Nomenclature | Read Chapter 4 | Reply to the Chapter 4 Prompt in the v2.0 Chemistry Discussion Questions Forum. | For practice (no need to turn in): Chapter 4 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 4 Homework quiz on Blackboard.<br><br>2) Complete ChemBalancer game (link) – Submit a screenshot of your score on BrainBoggle level.<br><br>3) Complete Grocery Store Nomenclature activity.<br><br>I will email you your clues when you are ready – just let me know |
| **Week 8** | | | | |
| **Week 9** | Measurements and Calculations | Read Chapter 5 | Reply to the Chapter 5 Prompt in the v2.0 Chemistry Discussion Questions Forum<br><br>Post First Draft of Essay and reply to members of your group about the strengths and weaknesses of | For practice (no need to turn in): Chapter 5 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 5 Homework quiz on Blackboard.<br><br>2) Perform: Ch. 5 lab (posted on blackboard site)<br><br>3) Submit: all data tables and questions for the lab.<br><br>4) Take Exam #1 |

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| | | | your essay (See Assignments tab on Blackboard for details) | |
| **Week 10** | | | | |
| **Week 11** | Chemical Composition | Read Chapter 6 | Reply to the Chapter 6 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 6 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 6 Homework quiz on Blackboard.<br><br>2) Perform: Chemical Quantities activities (found on Blackboard)<br><br>3) Submit: Data table and answers to all questions for Chemical Quantities activities<br><br>4) Perform: The Bean Lab (posted on blackboard site)<br><br>5) Submit: all data and questions for the bean lab |
| **Week 12** | | | | |
| **Week 13** | Chemical Reactions | Read Chapter 7 | Reply to the Chapter 7 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 7 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 7 Homework quiz on Blackboard.<br><br>2) Perform: "Chemical Reaction Types and their Equations" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin |
| **Week 14** | | | | |
| **Week 15** | Reactions in Aqueous Solutions | Read Chapter 8 | Reply to the Chapter 8 Prompt in the v2.0 Chemistry Discussion | For practice (no need to turn in): Chapter 8 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand. |

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| | | | Questions Forum | 1) Take Chapter 8 Homework quiz on Blackboard.<br><br>2) Perform: "Qualitative Analysis - Group I Cations" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin |
| **Week 16** | | | | |
| **Week 17** | Chemical Quantities | Read Chapter 9 | Reply to the Chapter 9 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 9 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 9 Homework quiz on Blackboard.<br><br>2) Perform: Chemistry in Action (p. 282 or pg.254) – use at least 15 nuts and 10 bolts<br><br>3) Submit: all questions and equations for Chem. In Action activity<br><br>4) Take Exam #2 |
| **Week 18** | | | | |
| **SEMESTER TWO** | | | | |
| | **Topic/Focus** | **Activities & Reading Assignments** | **What do I need to post to the Discussion Board?** | **What do I need to turn in?** |
| **Week 19** | Energy | Read Chapter 10 | Reply to the Chapter 10 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 10 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 10 Homework quiz on Blackboard.<br><br>2) Perform: Lab – Energy Value of Nuts (posted on blackboard)<br><br>3) Submit: all pre-lab questions, analysis and conclusions and "something extra" questions from the lab. |

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| **Week 20** | | | | |
| **Week 21** | Modern Atomic Theory | Read Chapter 11 | No discussion question for this chapter. | For practice (no need to turn in): Chapter 11 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 11 Homework quiz on Blackboard.<br><br>2) Perform: Electron Probability Lab (found on Blackboard)<br><br>3) Submit: Data/Observations, Analysis and Conclusions for lab |
| **Week 22** | | | | |
| **Week 23** | Chemical Bonding | Read Chapter 12 | No discussion question for this chapter.<br><br>Post 2nd draft of Essay. Peer review and write a comment to at least 2 essays in the Contest Essay forum. | For practice (no need to turn in): Chapter 12 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 12 Homework quiz on Blackboard.<br><br>1) Perform: Chemistry In Action – Geometric Balloons (p. 427 or pg.385)<br><br>2) Submit: Analysis questions from C.I.A. activity<br><br>3) View: Models of Molecules (link)<br><br>4) Submit: Prelab Assignment, Analysis and Conclusions and Summary Table from lab.<br><br>5) Take Exam #3 |
| **Week 24** | | | | |
| **Week 25** | Gases | Read Chapter 13 | Reply to the Chapter 13 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 13 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 13 Homework quiz on Blackboard.<br><br>2) Perform: "Molar Volume of a Gas" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin |

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| **Week 26** | Liquids and Solids | Read Chapter 14 | Reply to the Chapter 14 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 14 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 14 Homework quiz on Blackboard.<br><br>1) Perform: Heat of Fusion of Ice lab (on Blackboard)<br><br>2) Submit: Pre-lab assignment, Data/Observations and Analysis and Conclusions |
| **Week 27** | Solutions | Read Chapter 15 | Reply to the Chapter 15 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 15 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 15 Homework quiz on Blackboard.<br><br>1) Perform: "The Temperature Dependence on Salt Solubility" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin |
| **Week 28** | | | | |
| **Week 29** | Acids and Bases | Read Chapter 16 | Reply to the Chapter 16 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 16 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 16 Homework quiz on Blackboard.<br><br>2) Perform: "Titration Tutorial" and "Titration of Strong and Weak Acids" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin |
| **Week 30** | | | | |
| **Week 31** | Equilibrium | Chapter 17 | Reply to the Chapter 17 Prompt in the v2.0 Chemistry Discussion | For practice (no need to turn in): Chapter 17 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand. |

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| | | | Questions Forum | 1) Take Chapter 17 Homework quiz on Blackboard.<br><br>1) Perform: Chem in Action – Reaching Equilibrium – Are We There Yet? (p 604 or pg. 547)<br><br>2) Submit: Analysis questions from C.I.A. |
| **Week 32** | Oxidation-Reduction Reactions | Chapter 18 | Reply to the Chapter 18 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 18 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 18 Homework quiz on Blackboard.<br><br>2) Perform: "Activity Series of Metals" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin<br><br>3) Take Exam #4 |
| **Week 33** | Radioactivity and Nuclear Chemistry | Chapter 19 | Reply to the Chapter 19 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 19 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 19 Homework quiz on Blackboard.<br><br>2) Perform: The Half-Life of Pennies lab (on Blackboard)<br><br>2) Submit: Prelab Assignment, Data/Observations and Analysis and Conclusion<br><br>Please download simulation from Blackboard for class data.<br><br>3) Complete iLabs Radioactivity experiment |
| **Week 34** | | | Submit Final Draft of Essay | |
| **Week 35** | Organic Chemistry | Chapter 20 | Reply to the Chapter 20 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 20 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 20 Homework quiz on Blackboard.<br><br>2) Perform: Gluep lab (on Blackboard) |

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| | | | | 3) Submit: Data/Observations and Analysis and Conclusions |
| **Week 36** | Biochemistry | Chapter 21 | Reply to the Chapter 21 Prompt in the v2.0 Chemistry Discussion Questions Forum | For practice (no need to turn in): Chapter 21 Assessment questions (at the end of the chapter). Check all odd answers in the back, and ask questions on anything that you do not understand.<br><br>1) Take Chapter 21 Homework quiz on Blackboard.<br><br>2) Perform: Chem. In Action – Colorful Milk (p. 772 or pg.702)<br><br>3) Submit: Analysis questions from Chem In Action<br><br>4) Take Final Exam |



## Student Evaluation and Grading Policies for Credit Courses Only:

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| **A+** 97-100 | **B+** 87-89 | **C+** 77-79 | **D+** 67-69 | **F** Below 60 |
| **A** 93-96 | **B** 83-86 | **C** 73-76 | **D** 63-66 | |
| **A-** 90-92 | **B-** 80-82 | **C-** 70-72 | **D-** 60-62 | |

- Chapter Quizzes and Discussion Participation = 30% of the final grade.
  - Optional: For practice, it is recommended that you complete the odd numbered questions that are found at the end of each chapter. Please email me if you have questions on any of these problems.
  - All discussion prompts have been answered on the discussion board
  - Upon completion of reading and reviewing each chapter, a Chapter Homework quiz must be completed on Blackboard.

- Unit Exams = 40% of the final grade.
  - A comprehensive exam will be administered when students have completed all of the chapter assignments for a given unit.
  - Exams will consist mostly of short essay questions and problem solving.
  - Exams are open-book/open-note unless otherwise indicated and are due within one week after receipt.

- Lab Reports = 20% of the final grade.
  - A completed lab assignment is generally required from each chapter.
  - Only assignments that are typed and carefully proof read will be accepted.

- Contest Essay = 10% of the final grade.
  - A completed contest essay in one of a handful of science competitions.
  - Links provided under "Assignments" on Blackboard
  - A draft of your essay should be submitted after 3 months, 6 months, and your final draft is due at the end of the course.

## Instructor Biography:

David Chan currently teaches Chemistry at Evanston Township High School in Evanston, Illinois. He taught Chemistry, Physics, Algebra, and Geometry for five years at Roycemore School, also in Evanston, Illinois. Mr. Chan holds a Bachelor of Arts Degree in Chemistry from Northwestern University and a Master of Arts in Teaching from National-Louis University. When he's not in the Chemistry lab, Mr. Chan can be found on the basketball court as an assistant coach for the ETHS Girls' Varsity team, behind his computer as an instructor with CTD's Learning Links program, or on the couch watching his beloved Cubs struggle through yet another losing season. Mr. Chan has been involved with CTD since 2002, and this is his third full year with Learning Links.

## Contact Information:

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