

**BOROUGH OF MANHATTAN COMMUNITY COLLEGE**

City University of New York

**Department of Science**

**Title of Course COLLEGE CHEMISTRY II**

**CHE 202 Section \_\_\_\_\_**

**Credits 4**

**Class hours 4**

**Lab hours 3**

**Instructor Information**

**Name:**

**Office:**

**Room:**

**Email:**

**Course Description**

This is the second semester of a two-semester course sequence that involves the study of chemical principles including atomic and molecular theories, molecular structure, and reactivity. The laboratory will include experiments illustrating the chemical principles.

*Two terms required. Required in A.S. (Science) and A.S. (Engineering Science). Fulfills science requirement for A.A. (Liberal Arts). Two terms required.*

**Prerequisites/Co-requisites**

CHE 201

**Student Learning Outcomes**

1. Students will be able to learn the concepts and principles of chemistry.
2. Students will be able to recognize the importance of and develop a skill in problem solving.
3. Students will be able to relate chemistry to all areas of science.
4. Students will be able to unify the diverse topics of chemistry

**Required Text & Readings**

1. Jones, L. and Atkins, P., *Chemistry: Molecules, Matter and Change, 4<sup>th</sup> Ed*, W.H. Freeman, 2000

(BMCC Library Call #: QD31.2.A75)

2. Wentworth, R. A. D., *Experiments in General Chemistry 7<sup>th</sup> Ed*, Houghton Mifflin, 2002

(BMCC Library Call #: QD31.2.E22)

**Other Resources**

**Use of Technology (if applicable)**

**Evaluation & Requirements of Students**

There will be a minimum of four one hour examinations, a comprehensive final examination and fulfillment of all laboratory assignments.

## Outline of Topics

Chapter/Section	Lecture Topic	Pages
Chapter 11	Organic Chemistry, Polymers, Biopolymers	
11.1	Hydrocarbons	472 –474
11.2	Alkanes	474 –477
11.3	Alkenes and Alkynes	477 –479
11.4	Aromatic Compounds	479 –484
11.5	Alcohols	485 –485
11.6	Ethers	488 –488
11.7	Phenols	488 –488
11.8	Aldehydes and Ketones	489 –490
11.9	Carboxylic Acids and Esters	490 –491
11.10	Amines and Amides	491 –493
11.11	Structural Isomers	494 –495
11.12	Geometrical and Optical Isomers	496 –498
11.13	Addition Polymerization	499 –502
11.14	Condensation Polymerization	502 –506
11.15	Physical Properties	506 –508
Chapter 12	Solutions	
12.1	The Solution Process	525 –525
12.2	Solubility	525 –526
12.3	Ionic Compound Solubilities	527 –528
12.4	Polarity and Solubility	528 –532
12.5	Colloids	532 –533
	Biomimetic Materials (Case Study 12)	534 –535
12.6	Pressure and Gas Solubility	533 –537
12.7	Temperature and Solubility	537 –537
12.8	Enthalpy of Solution	538 –549
12.9	Individual Ion Hydration Enthalpies	540 –541
12.10	Solubility and Disorder	541 –543
12.11	Measures of Concentration	544 –549
12.12	Vapor Pressure Lowering	549 –551
12.13	Boiling Point Elevation and Freezing Point Depression	551 –555
12.14	Osmosis	555 –559
Chapter 13	Chemical Kinetics	
13.1	Definition of Reaction Rate	570 –571
13.2	Instantaneous Rate of Reaction	571 –572
13.3	Rate Laws	572 –579
13.4	Complicated Rate Laws	579 –579
13.5	First Order Integrated Rate Laws	579 –583
13.6	Half Life for a First Order Reaction	583 –584
13.7	Second Order Integrated Rate Laws	584 –586
13.8	Effect of Temperature	587 –591
13.9	Origin of the Temperature Dependence	591 –595
13.10	Catalysis	595 –598
13.11	Living Catalysts: Enzymes	598 –598
13.12	Elementary Reactions	599 –603



16.16 Complex Ions and Solubilities 738 -739

**Chapter 17 Thermodynamics and Equilibrium**

17.1 Spontaneous Change	756 -756
17.2 Entropy and Disorder	756 -762
17.3 Absolute Entropies	763 -765
17.4 Reaction Entropy	765 -766
17.5 Entropy of the Surroundings	766 -768
17.6 Entropy of the System	769 -770
17.7 Free Energy and Equilibrium	770 -771
17.8 Standard Reaction Free Energies	771 -775
17.9 Free Energies of Formation	775 -776
11.17 Carbohydrates	511-513
17.10 Free Energy and Composition	776 -779
17.11 Equilibrium Constants	779 -781
17.12 Effect of Temperature	781 -782

**Chapter 18 Electrochemistry**

18.1 Half Reactions	792 -793
18.2 Balancing Redox Equations	792 -797
18.3 Structure of a Galvanic Cell	797 -799
18.4 Cell Notation	799 -800
18.5 Cell Potential	800 -803
18.6 Standard Cell Potentials	803 -806
18.7 Standard Potentials	806 -808
18.8 Electrochemical Series	808 -810
18.9 Standard Potentials, Free Energy and Equilibrium Constants	810 -815
18.10 Nernst Equation	815 -817
18.11 Practical Cells	817 -821
18.12 Corrosion	821 -823
18.13 Electrolytic Cells	824 -824
18.14 Electrolysis Potential	824 -826
18.15 Electrolysis Products	826 -830
18.16 Electrolysis Applications	830 -831

**Chapter 21 Transition Metals**

21.1 Trends in Physical Properties	918 -920
21.2 Trends in Chemical Properties	920 -922
21.5 Transition Metal Complexes	934 -936
21.6 Isomers	936 -943
21.7 Ligand Field Splitting	943 -945
21.8 Colors of Transition Metal Complexes	945 -947
21.9 Electronic Structure of Many Electron Complexes	947 -950
21.10 Magnetic Properties of Complexes	950 -952

**Chapter 22 Nuclear Chemistry**

22.1 Spontaneous Nuclear Decay	960 -961
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22.2 Nuclear Reactions	962 –966
22.3 Nuclear Stability	966 –968
22.4 Nucleosynthesis	969 –970
22.5 Biological Effects of Radiation	971 –974
11.18 DNA and RNA	513-515
22.6 Radioactive Measurements	974 -976
22.7 Radioactive Decay	976 –981
22.8 Mass Energy Conversion	981 –983
22.9 Nuclear Fission	983 –987
22.10 Nuclear Fusion	987 –988
22.11 Nuclear Power	989 -990

### **Laboratory**

Experiment	Title	Page
	Laboratory Safety and Laboratory Rules	
24	Molecular Models of Organic Molecules	
12A	Molar Mass From Freezing Point Depression	211
4A	Conductivity of Aqueous Solutions	75
12B	Softening Hard Water	225
14	Rate of Iodine Clock Reaction	245
15A	Le Chatelier's Principle	259
15B	Determining an Equilibrium Constant	271
16	Relative Strengths of Some Acids	283
17B	An Acid Base Titration Curve	301
18A	A Solubility Product Constant	317
19	Spontaneity	339
20B	Electrochemistry	361
23	Thermochemisrtry and Complex Ions	427
21	Natural Radioactivity	395

**College Attendance Policy**

At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a three-hour class. In that class, you would be allowed 4 hours of absence (not 4 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

**Academic Adjustments for Students with Disabilities**

Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

**BMCC Policy on Plagiarism and Academic Integrity Statement**

Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's web side, [www.bmcc.cuny.edu](http://www.bmcc.cuny.edu). For further information on integrity and behavior, please consult the college bulletin (also available online).