

## Enquiry for Course Details

<b>CHEM1042 General chemistry I (6 credits)</b>		Academic Year	2021												
Offering Department	Chemistry	Quota	450												
Course Co-ordinator	Dr A P L Tong, Chemistry < apltong@hku.hk >														
Teachers Involved	(Dr A P L Tong, Chemistry)														
Course Objectives	The course aims to provide students with a solid foundation of the basic principles and concepts of chemistry. It also provides students with hands-on training of basic laboratory skills and techniques including volumetric analysis, preparation, purification and characterization of chemical substances and some basic instrumental methods. Students will be equipped with a good foundation of theoretical and practical knowledge and skills for further studies in Chemistry.														
Course Contents & Topics	<p>1. Chemistry: its nature and method Physical properties; chemical changes and chemical properties; elements and compounds; measuring mass, length, volume and temperature; atomic structure and subatomic particles; the mole concept and stoichiometry; solutions and concentrations; uncertainty in measurement and significant figures.</p> <p>2. Atoms: the quantum world Electromagnetic radiation and matter; Planck's quantum theory; the Bohr model of the hydrogen atom; the quantum mechanical model of the atom; quantum numbers, energy levels, and atomic orbitals; shapes of atomic orbitals; electron configurations; periodic trends: atomic radii, ionic radii, ionization energies, and electron affinities.</p> <p>3. Chemical bonding and structures Review on covalent, ionic and metallic bond. Covalent bonds and molecular structures (VSEPR, VB theory).</p> <p>4. Energetics and kinetics of reactions Heat and work; the first law of thermodynamics; heat of reactions; spontaneity of changes. Reaction rate; factors that influence reaction rate; rate laws: differential and integrated rate laws; temperature and reaction rate; reaction mechanisms.</p> <p>5. Acid-Base equilibria Acid-base concepts; equilibria in solutions of weak acids and in weak bases; ionization constants; molecular properties and acid strength; acid-base properties of salt solutions; buffer solutions; acid-base titrations.</p>														
Course Learning Outcomes	<p>On successful completion of this course, students should be able to:</p> <table border="1"> <tr> <td>CLO 1</td> <td>demonstrate a basic knowledge and understanding of the microscopic nature of atomic structure and concepts of chemical bonding and their relationships with the bulk properties of matter</td> </tr> <tr> <td>CLO 2</td> <td>demonstrate knowledge and understanding in relation to thermodynamics and kinetics of reactions as well as aqueous equilibria including acid-base equilibria</td> </tr> <tr> <td>CLO 3</td> <td>apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends</td> </tr> <tr> <td>CLO 4</td> <td>carry out chemical experiments with proper procedures, record experimental observations accurately, and interpret and evaluate the experimental data</td> </tr> <tr> <td>CLO 5</td> <td>organize and present chemical ideas in a clear, logical and coherent way</td> </tr> <tr> <td>CLO 6</td> <td>demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life</td> </tr> </table>			CLO 1	demonstrate a basic knowledge and understanding of the microscopic nature of atomic structure and concepts of chemical bonding and their relationships with the bulk properties of matter	CLO 2	demonstrate knowledge and understanding in relation to thermodynamics and kinetics of reactions as well as aqueous equilibria including acid-base equilibria	CLO 3	apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends	CLO 4	carry out chemical experiments with proper procedures, record experimental observations accurately, and interpret and evaluate the experimental data	CLO 5	organize and present chemical ideas in a clear, logical and coherent way	CLO 6	demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life
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Pre-requisites (and Co-requisites and Impermissible combinations)	<p>Level 3 or above in HKDSE Chemistry or equivalent or a pass in CHEM1041. Not for students having taken any level 1 Chemistry course (except for CHEM1041) or above or any equivalent Chemistry course.</p>														

<p>Course Status with Related Major/Minor /Professional Core</p>	<p>2021 Major in Biochemistry ( Core/Compulsory )  2021 Major in Biological Sciences (Intensive) ( Core/Compulsory )  2021 Major in Chemistry ( Core/Compulsory )  2021 Major in Chemistry (Intensive) ( Core/Compulsory )  2021 Major in Ecology &amp; Biodiversity (Intensive) ( Disciplinary Elective )  2021 Major in Environmental Science ( Core/Compulsory )  2021 Major in Food &amp; Nutritional Science ( Disciplinary Elective )  2021 Major in Molecular Biology &amp; Biotechnology (Intensive) ( Core/Compulsory )  2021 Minor in Chemistry ( Core/Compulsory )  2021 Minor in Environmental Science ( Disciplinary Elective )  2020 Major in Biochemistry ( Core/Compulsory )  2020 Major in Biological Sciences (Intensive) ( Core/Compulsory )  2020 Major in Chemistry ( Core/Compulsory )  2020 Major in Chemistry (Intensive) ( Core/Compulsory )  2020 Major in Ecology &amp; Biodiversity (Intensive) ( Disciplinary Elective )  2020 Major in Environmental Science ( Core/Compulsory )  2020 Major in Food &amp; Nutritional Science ( Disciplinary Elective )  2020 Major in Molecular Biology &amp; Biotechnology (Intensive) ( Core/Compulsory )  2020 Minor in Chemistry ( Core/Compulsory )  2020 Minor in Environmental Science ( Disciplinary Elective )  2019 Major in Biochemistry ( Core/Compulsory )  2019 Major in Biological Sciences (Intensive) ( Core/Compulsory )  2019 Major in Chemistry ( Core/Compulsory )  2019 Major in Chemistry (Intensive) ( Core/Compulsory )  2019 Major in Ecology &amp; Biodiversity (Intensive) ( Disciplinary Elective )  2019 Major in Environmental Science ( Core/Compulsory )  2019 Major in Food &amp; Nutritional Science ( Disciplinary Elective )  2019 Major in Molecular Biology &amp; Biotechnology (Intensive) ( Core/Compulsory )  2019 Minor in Chemistry ( Core/Compulsory )  2019 Minor in Environmental Science ( Disciplinary Elective )  2018 Major in Biochemistry ( Core/Compulsory )  2018 Major in Biological Sciences (Intensive) ( Core/Compulsory )  2018 Major in Chemistry ( Core/Compulsory )  2018 Major in Chemistry (Intensive) ( Core/Compulsory )  2018 Major in Ecology &amp; Biodiversity (Intensive) ( Disciplinary Elective )  2018 Major in Environmental Science ( Core/Compulsory )  2018 Major in Molecular Biology &amp; Biotechnology (Intensive) ( Core/Compulsory )  2018 Minor in Chemistry ( Core/Compulsory )  2018 Minor in Environmental Science ( Disciplinary Elective )  2017 Major in Biochemistry ( Core/Compulsory )  2017 Major in Biological Sciences (Intensive) ( Core/Compulsory )  2017 Major in Chemistry ( Core/Compulsory )  2017 Major in Chemistry (Intensive) ( Core/Compulsory )  2017 Major in Ecology &amp; Biodiversity (Intensive) ( Disciplinary Elective )  2017 Major in Environmental Science ( Disciplinary Elective )  2017 Major in Molecular Biology &amp; Biotechnology (Intensive) ( Core/Compulsory )  2017 Minor in Chemistry ( Core/Compulsory )  2017 Minor in Environmental Science ( Disciplinary Elective )</p>
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Course to PLO Mapping	<p>2021 Major in Biochemistry &lt; PLO 1,2,3,4,5 &gt;  2021 Major in Biological Sciences (Intensive) &lt; PLO 1,2 &gt;  2021 Major in Chemistry &lt; PLO 1,2,4,5 &gt;  2021 Major in Chemistry (Intensive) &lt; PLO 1,2,4,5 &gt;  2021 Major in Ecology &amp; Biodiversity (Intensive) &lt; PLO 4 &gt;  2021 Major in Environmental Science &lt; PLO 1,2 &gt;  2021 Major in Food &amp; Nutritional Science &lt; PLO 1,2,3 &gt;  2021 Major in Molecular Biology &amp; Biotechnology (Intensive) &lt; PLO 1,2,3,4 &gt;  2020 Major in Biochemistry &lt; PLO 1,2,3,4,5 &gt;  2020 Major in Biological Sciences (Intensive) &lt; PLO 1,2 &gt;  2020 Major in Chemistry &lt; PLO 1,2,4,5 &gt;  2020 Major in Chemistry (Intensive) &lt; PLO 1,2,4,5 &gt;  2020 Major in Ecology &amp; Biodiversity (Intensive) &lt; PLO 4 &gt;  2020 Major in Environmental Science &lt; PLO 1,2 &gt;  2020 Major in Food &amp; Nutritional Science &lt; PLO 1,2,3 &gt;  2020 Major in Molecular Biology &amp; Biotechnology (Intensive) &lt; PLO 1,2,3,4 &gt;  2019 Major in Biochemistry &lt; PLO 1,2,3,4,5 &gt;  2019 Major in Biological Sciences (Intensive) &lt; PLO 1,2 &gt;  2019 Major in Chemistry &lt; PLO 1,2,4,5 &gt;  2019 Major in Chemistry (Intensive) &lt; PLO 1,2,4,5 &gt;  2019 Major in Ecology &amp; Biodiversity (Intensive) &lt; PLO 4 &gt;  2019 Major in Environmental Science &lt; PLO 1,2 &gt;  2019 Major in Food &amp; Nutritional Science &lt; PLO 1,2,3 &gt;  2019 Major in Molecular Biology &amp; Biotechnology (Intensive) &lt; PLO 1,2,3,4 &gt;  2018 Major in Biochemistry &lt; PLO 1,2,3,4,5 &gt;  2018 Major in Biological Sciences (Intensive) &lt; PLO 1,2 &gt;  2018 Major in Chemistry &lt; PLO 1,2,4,5 &gt;  2018 Major in Chemistry (Intensive) &lt; PLO 1,2,4,5 &gt;  2018 Major in Ecology &amp; Biodiversity (Intensive) &lt; PLO 4 &gt;  2018 Major in Environmental Science &lt; PLO 1,2 &gt;  2018 Major in Molecular Biology &amp; Biotechnology (Intensive) &lt; PLO 1,2,3,4 &gt;  2017 Major in Biochemistry &lt; PLO 1,2,3,4,5 &gt;  2017 Major in Biological Sciences (Intensive) &lt; PLO 1,2 &gt;  2017 Major in Chemistry &lt; PLO 1,2,4,5 &gt;  2017 Major in Chemistry (Intensive) &lt; PLO 1,2,4,5 &gt;  2017 Major in Ecology &amp; Biodiversity (Intensive) &lt; PLO 4 &gt;  2017 Major in Environmental Science &lt; PLO 1,2 &gt;  2017 Major in Molecular Biology &amp; Biotechnology (Intensive) &lt; PLO 1,2,3,4 &gt;</p>															
Offer in 2021 - 2022	Y	1st sem	2nd sem	Examination	Dec	May										
Offer in 2022 - 2023	Y															
Course Grade	A+ to F															
Grade Descriptors	<table border="1"> <tr> <td>A</td> <td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Show highly effective lab skills and techniques. Apply highly effective organizational and presentational skills.</td> </tr> <tr> <td>B</td> <td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques. Apply effective organizational and presentational skills.</td> </tr> <tr> <td>C</td> <td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills.</td> </tr> <tr> <td>D</td> <td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills.</td> </tr> <tr> <td>Fail</td> <td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.</td> </tr> </table>						A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Show highly effective lab skills and techniques. Apply highly effective organizational and presentational skills.	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques. Apply effective organizational and presentational skills.	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills.	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills.	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.
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Course Type	Lecture with laboratory component course															
Course Teaching & Learning Activities	<b>Activities</b>		<b>Details</b>		<b>No. of Hours</b>											
	Laboratory				24											
	Lectures				24											
	Tutorials				6											
	Reading / Self study				100											
Assessment Methods and Weighting	<b>Methods</b>		<b>Details</b>		<b>Weighting in final course grade (%)</b>		<b>Assessment Methods to CLO Mapping</b>									
	Examination				60		CLO 1,2,3,5,6									
	Laboratory reports				25		CLO 1,2,3,4,5,6									
	Test				15		CLO 1,2,3,5,6									

Required/recommended reading and online materials	Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson. Zumdahl; Decoste: Chemical Principles, latest edition, Cengage. Brown; LeMay; Bursten; Murphy; Woodward; Stoltzfus: Chemistry - The Central Science, latest edition, Pearson.
Course Website	NIL
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.