CHEMISTRY (CHEM)

Updated April 24, 2024

Chair: Professor J. Hollett; Professors: D. Craig, D. Goltz, C. Wiebe; Associate Professors: M. Eze, J. Hollett, A. McCubbin, J. Ritch, D. Vanderwel, T. Wood; Instructors: K. Buffie, J. Galka, D. Latimer, K. Stevenson

DEGREES/PROGRAMS OFFERED

3-Year BSc 3-Year BSc (Business Stream) 4-Year BSc 4-Year BSc (Business Stream) Honours BSc Honours BSc (Business Stream) 4-Year BSc (UW/RRC Polytech) - <u>NOTE</u>: This program is being discontinued. No new students will be admitted.

INTRODUCTION

Chemistry is the study of the property and composition of matter, the transformations that matter may undergo, and the energies associated with such transformations. There are five main areas of chemistry: analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, and biochemistry. The department offers a solid foundation in each of these areas, plus more advanced courses for specialization at the senior level.

The Department of Chemistry offers 3-year, 4-year, and Honours BSc degrees in Chemistry. The department is also involved in several other interdisciplinary programs, most notably Biochemistry, Chemical Physics, and Environmental Studies (Chemistry Stream). An additional option available is the 4-year BSc program in Applied Chemistry, offered jointly by the University of Winnipeg and Red River College. Students pursuing a 3-year or 4-year BSc in Chemistry have the opportunity to take a Business Stream – a set of core courses in the Faculty of Business that will provide them with the skills needed to enter and succeed in industry and business. After completing the requirements of the BSc degree and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar, it will be noted on the student's transcript that they have satisfied the requirements of a BSc degree with a Business stream.

Chemists are involved in many fields, including environmental protection, pharmaceutical science, forensic science, toxicology, agricultural science, food science, education, geochemistry, biochemistry, materials science, biotechnology, oceanography, computer modelling, and plant management. Graduates from a 3-year BSc in Chemistry may proceed to professional schools in a health-related area (such as pharmacy, medicine, veterinary medicine, or dentistry), or to careers as diverse as education, library science, business administration, public administration, engineering and law. Graduates with 4-year or Honours degrees in Chemistry usually proceed directly to employment or to graduate school (to obtain an MSc or PhD degree). Ultimately, most obtain jobs either as technicians, managers, consultants or research scientists in industry or in government.

Arts students, with the required prerequisites, may take CHEM-1111(3) Introduction to the Chemical Properties of Matter, CHEM-1112(3) Basic Principles of Reactivity, or CHEM-2801(3) Environmental Issues: A Chemistry Perspective towards their Science requirement.

GENERAL INFORMATION

Prerequisites

Chemistry 40S AND either Pre-Calculus OR Applied Mathematics 40S are required for acceptance to the Chemistry Major program.

Laboratory Work

Laboratory work has been designed to complement the lecture material; students are able to work in small lab sections with the possibility of individual projects. In advanced labs, modern instrumental techniques and computer facilities are used extensively.

Pre-professional Program Requirements Students planning to enter the Faculties of D

dents planning to enter the Facul	ties of Dentistry or Medicine are required to take the following courses:
CHEM-1111(3)	Introduction to the Chemical Properties of Matter
CHEM-1112(3)	Basic Principles of Chemical Reactivity
CHEM-2202(3)	Organic Chemistry I
CHEM-2203(3)	Organic Chemistry II
CHEM-3502(3)	Intermediate Biochemistry I
CHEM-3503(3)	Intermediate Biochemistry II

Students planning to enter professional faculties would normally take the above courses in sequence. However, provided that a minimum grade of 75 (or equivalent) was obtained in Chemistry 40S, the course CHEM-1111(3) may be taken concurrently with CHEM-2202(3), while CHEM-1112(3) may be taken concurrently with CHEM-2203(3). Also, provided that a minimum grade of B+ was obtained in both CHEM-1111(3) and CHEM-1112(3), the course CHEM-2202(3) may be taken concurrently with CHEM-3502(3), while CHEM-2203(3) may be taken concurrently with CHEM-3503(3).

REQUIREMENTS FOR THE 3-YEAR BSc IN CHEMISTRY

ADMISSION REQUIREMENT	Students must consult with a department advisor in planning their course of study.		
GRADUATION REQUIREMENT	90 credit hours		
RESIDENCE REQUIREMENT Degree: Major:	Minimum 30 credit hours Minimum 18 credit hours		
GENERAL DEGREE REQUIREMENT Humanities: Writing: Indigenous: Maximum Introductory Courses: Distribution:	 12 credit hours in Humanities Minimum 3 credit hours of Academic Writing. 3 credit hours in designated Indigenous requirement courses Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 48 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses. Minimum three (3) credit hours from each of five (5) different subjects. 		
MAJOR REQUIREMENT Single Major: Double Major:	Minimum 33 credit hours/Maximum 48 credit hours in Major subject. 33 credit hours in Chemistry and specified number of credit hours in the other department/program.		
Required courses: CHEM-1111(3) Introduction to the of of Matter CHEM-1112(3) Basic Principles of CHEM-2102(3) Thermodynamics a <u>OR</u> CHEM-2103(3) Atoms, Molect Spectroscopy CHEM-2202(3) Organic Chemistry CHEM-2203(3) Organic Chemistry	Chemical Properties CHEM-2302(3) Quantitative Chemical Analysis Chemical Reactivity Inorganic Chemistry I Chemical Reactivity MATH-1101(6) Introduction to Calculus Iles and OR MATH-1103(3) Introduction to Calculus I PHYS-1101(6) Foundations of Physics I I OR PHYS-1301(6) Introduction to Physics		

Plus an additional 12 credit hours of 2000-, 3000-, and/or 4000-level Chemistry courses.

Combined Major:

Prescribed Courses:

15 credit hours from CHEM-2102(3) Thermodynamics, CHEM-2202(3) Organic Chemistry I, CHEM-2203(3) Organic Chemistry II, CHEM-2302(3) Quantitative Chemical Analysis, CHEM-2401(3) Inorganic Chemistry I.

3 credit hours from CHEM-3101(3) Physical Chemistry of Condensed Phases, CHEM-3102(3) Quantum Chemistry and Spectroscopy, CHEM-3202(3) Reaction Mechanisms in Organic Chemistry, CHEM-3204(3) Organic Structure Determination, CHEM-3205(3) Organic Synthesis, CHEM-3302(3) Methods of Chemical Analysis, CHEM-3401(3) Inorganic Chemistry II, CHEM-3502(3) Intermediate Biochemistry I, CHEM-3503(3) Intermediate Biochemistry II, CHEM-3601(3) Environmental Chemistry.

Students must complete a Declaration of Major in a three-year Degree Program form, available from Student Central, before entering Year 2 of their studies.

Students are advised to consult with the Department when planning their studies.

REQUIREMENTS FOR THE 3-YEAR BSc IN CHEMISTRY WITH A BUSINESS STREAM

Students must complete the requirements of the 3-year BSc in Chemistry degree (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar.

REQUIREMENTS FOR THE 4-YEAR BSc IN CHEMISTRY

ADMISSION REQUIREMENT	Students must consult with a department advisor when planning their studies.
GRADUATION REQUIREMENT	120 credit hours, that is, 90 credit hours meeting the requirements for the 3-Year BSc plus 30 additional credit hours.
RESIDENCE REQUIREMENT Degree:	Minimum 60 credit hours

Major:

Minimum 30 credit hours

GENERAL DEG Humanities: Writing: Indigenous: Maximum Intro Distribution:	REE REQUIREMENT	 12 credit hours in Humanities. Minimum 3 credit hours of Academic Writing. 3 credit hours in designated Indigenous requirement courses Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 78 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses. Minimum three (3) credit hours from each of five (5) different subjects. 		
MAJOR REQUIE Single Major: Double Major:	REMENT	Minimum 54 credit hours/Maximum 78 credit hours in the Major subject. Maximum total of cognate and major courses is 84 credit hours combined. Minimum 54 credit hours in Chemistry and specified number of credit hours in other Major.		
Required cour CHEM-1111(3) CHEM-2102(3) CHEM-2103(3) CHEM-2202(3) CHEM-2203(3) CHEM-2302(3) CHEM-2401(3)	ses: Introduction to the Ch of Matter Basic Principles of Cl Thermodynamics and Atoms, Molecules an Organic Chemistry I Quantitative Chemica Inorganic Chemistry	hemical Properties CHEM-2502(3) Introduction to Biochemistry OR CHEM-3502(3) Intermediate Biochemistry I Chemical Reactivity CHEM-3302(3) Methods of Chemical Analysis d Kinetics CHEM-3401(3) Inorganic Chemistry II: Coordination nd Spectroscopy CHEM-4401(3) Introduction to Calculus I OR MATH-1101(6) Introduction to Calculus I al Analysis OR MATH-1104(3) Introduction to Calculus I I PHYS-1101(6) Foundations of Physics I OR		Introduction to Biochemistry D2(3) Intermediate Biochemistry I Methods of Chemical Analysis Inorganic Chemistry II: Coordination Chemistry Introduction to Calculus D3(3) Introduction to Calculus I FH-1104(3) Introduction to Calculus II Foundations of Physics I D1(6) Introduction to Physics
Minimum 3 credit hours selected from the following courses: PSYC-2101(3) Introduction to Data Analysis STAT-1301(3) Statistical Analysis I (or the former STAT-1201(6) Intro to Stat Analysis) STAT-1501(3) Elementary Biological Statistics I Any Mathematics course numbered 2000 or above (MATH-2xxx) with the exceptions of MATH-2901(3) (History of Calculus) MATH-2902 (Math Prior to 1640), MATH-2905 (MATH/PHIL-2305 Philosophy and Mathematics) and MATH-2801(6) (Fundamentals of Computing), MATH-2903 Math for Early/Middle Year Teachers I.				
Plus an additional 21 credit hours of 2000-, 3000- and/or 4000-level Chemistry courses. Selection of Chemistry Courses: The 4-Year major requires a minimum of 54 credit hours in Chemistry. Since some senior courses are given in alternate years, all 4-Year majors are urged to seek academic				

advising within the Department <u>EACH YEAR</u> to avoid potential scheduling problems. The following pattern of Chemistry courses is suggested:

Year 1 - 6 credit hours: CHEM-1111(3) Introduction to the Chemical Properties of Matter; CHEM-1112(3) Basic Principles of Chemical Reactivity.

Year 2 - 12 to 18 credit hours of the following required courses: CHEM-2102(3) Thermodynamics and Kinetics; CHEM-2103(3) Atoms, Molecules and Spectroscopy; CHEM-2202(3) Organic Chemistry I; CHEM-2203(3) Organic Chemistry II; CHEM-2302(3) Quantitative Chemical Analysis; CHEM-2401(3) Inorganic Chemistry I; CHEM-2502 (3) Introduction to Biochemistry; CHEM-3302(3) Methods of Chemical Analysis; CHEM-3401(3) Inorganic Chemistry II.

Note: If CHEM-3401(3) is selected then CHEM-2202(3) and CHEM-2203(3) must also be taken in Year 2. Students are advised to consult with the Department.

Year 3 - 18 credit hours in Chemistry, including the required courses that were not taken in Year 2.

Year 4 - 18 credit hours in Chemistry.

Note: A student would normally specialize in one or more areas of Chemistry (Analytical, Organic, Physical, Inorganic, Biochemistry) in Years 3 and 4 and should seek advice concerning course selection.

Note: It is recommended the following be taken in :

Year 1: MATH-1101(6) Introduction to Calculus <u>OR</u> MATH-1103(3) Introduction to Calculus I <u>AND</u> MATH-1104(3) Introduction to Calculus II

Year 1 or 2: **PHYS-1101(6)** Foundations of Physics I <u>OR</u> **PHYS-1301(6)** Introduction to Physics **Students** must complete a 4-Year BSc Degree form, available from Student Services.

Combined Major:

Prescribed Courses:

15 credit hours from CHEM-2202(3) Organic Chemistry I, CHEM-2203(3) Organic Chemistry II, CHEM-2102(3) Thermodynamics and Kinetics, CHEM-2302(3) Quantitative Chemical Analysis, CHEM-2401(3) Inorganic Chemistry I.

3 credit hours from CHEM-3101(3) Physical Chemistry of Condensed Phases, CHEM-3102(3) Quantum Chemistry and Spectroscopy, CHEM-3202(3) Reaction Mechanisms in Organic Chemistry, CHEM-3204(3) Organic Structure Determination, CHEM-3205(3) Organic Synthesis, CHEM-3302(3) Methods of Chemical Analysis, CHEM-3401(3) Inorganic Chemistry II, CHEM-3502(3) Intermediate Biochemistry I, CHEM-3503(3) Intermediate Biochemistry II, CHEM-3601(3) Environmental Chemistry.

REQUIREMENTS FOR THE 4-YEAR BSc IN CHEMISTRY WITH A BUSINESS STREAM

Students must complete the requirements of the 4-year BSc in Chemistry degree (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar.

REQUIREMENTS FOR THE BSc (HONOURS) IN CHEMISTRY

ADMISSION REQUIREMENT	Students must have completed 30 credit hours. Students must consult with and have the approval of the Department Chair or the Chair's designate when planning their studies.			
GRADUATION REQUIREMENT Graduation GPA Requirement:	120 credit hours To graduate with a BSc (Honours), students must have a minimum GPA of 3.0 on all major (Chemistry) courses which will be calculated on all course attempts in the major, and a minimum GPA of 2.75 on all non-major courses which will be calculated as for the general degree.			
RESIDENCE REQUIREMENT Degree: Honours:	 Minimum 60 credit hours Minimum 30 credit hours, including minimum 18 credit hours at upper level (3000/4000) which a minimum of 9 credit hours at 4000 level. 			
GENERAL DEGREE REQUIREMENT Humanities: Writing: Indigenous:	 12 credit hours in Humanities. Minimum 3 credit hours of Academic Writing. 3 credit hours in designated Indigenous requirement courses 			
Maximum Introductory Courses: Distribution:	Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 78 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses. Minimum three (3) credit hours from each of five (5) different subjects.			
HONOURS REQUIREMENT Single Honours:	Minimum 60 credit hours in the Major subject. Minimum 30 credit hours in upper-level (3000 and 4000) Honours subject courses of which a minimum of 12 credit hours must be at the 4000 level.			
Required courses: CHEM-1111(3) Introduction to the Ch Matter CHEM-2102(3) Basic Principles of Chu CHEM-2103(3) Atoms, Molecules and CHEM-2202(3) Organic Chemistry I CHEM-2203(3) Organic Chemistry II CHEM-2302(3) Quantitative Chemical CHEM-2401(3) Inorganic Chemistry I CHEM-2502(3) Introduction to Biocher <u>OR</u> CHEM-3502(3) Intermediate Bio	emical Properties of emical Reactivity KineticsCHEM-3302(3) CHEM-4302(3) Inorganic Chemistry II Instrumentation for Quantitative Analysis CHEM-4303(3) Analytical Separations CHEM-4701(6) AnalysisCHEM-4303(3) CHEM-4701(6) OR MATH-1103(3) Introduction to Calculus I OR MATH-1103(3) Introduction to Calculus II PHYS-1101(6) Foundations of Physics I OR PHYS-1301(6)Methods of Chemical Analysis Chemistry I			
Minimum O and did because a classical former al				

Minimum 3 credit hours selected from the following courses:

PSYC-2101(3) Introduction to Data Analysis

STAT-1301(3) Statistical Analysis I (or_the former STAT-1201(6) Intro to Stat Analysis) STAT-1501(3) Elementary Biological Statistics I

Any Mathematics course numbered 2000 or above (MATH-2xxx) with the exceptions of MATH-2901(3) (History of Calculus) MATH-2902 (Math Prior to 1640), MATH-2905 (MATH/PHIL-2305 Philosophy and Mathematics) and MATH-2801(6) (Fundamentals of Computing), MATH-2903 Math for Early/Middle Year Teachers I. Plus an additional 15 credit hours of 2000-, 3000- and/or 4000 level Chemistry courses.

Plus an additional 18 credit hours selected from at least 2 departments and from the following list:BIOL-1115(3)Cells and Cellular ProcessBIOL-1116(3)Evolution, Ecology and Biodiversity

BIOL-2301(3)	Genetics	MATH-3101(6)	Advanced Calculus
BIOL-3303(3)	Molecular Genetics and Genomics	PHYS-2105 (3)	Mathematical Physics I
BIOL-3221(3)	Cell Biology	PHYS-2106 (3)	Mathematical Physics II
BIOL-3901(3)	Microorganisms and Disease	PHYS-2201(6)	Electricity and Magnetism
GEOG-1201(3)	Introductory Atmospheric Science	PHYS-2302(6)	Foundations of Physics II
GEOG-1202(3)	Introductory Earth Science	STAT-1301 (3)	Statistical Analysis I
GEOG-2213(3)	Introductory Soil Science	STAT-1302 (3)	Statistical Analysis II
GEOG-2214(3)	Soil-Vegetation Systems	STAT-1201 (6)	Introduction to Statistical Analysis
MATH-1201(3)	Linear Algebra I		
MATH-2101(6)	Intermediate Calculus	STAT-2001(3)	Statistical Analysis for Chemists and
MATH-2102(3)	Differential Equations I		Biologists
MATH-2103(3)	Differential Equations II	STAT-2501(3)	Statistical Quality Control
MATH-2203(3)	Linear Algebra II	STAT-2903(3)	Introduction to Statistical Computing

Students must complete an Honours BSc Degree form, available from Student Central.

REQUIREMENTS FOR THE HONOURS BSc IN CHEMISTRY WITH A BUSINESS STREAM

Students must complete the requirements of the Honours BSc in Chemistry degree (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar.

REQUIREMENTS FOR THE UNIVERSITY OF WINNIPEG / RRC POLYTECH 4-YEAR BSc (JOINT PROGRAM IN APPLIED CHEMISTRY)

<u>NOTE:</u> The Joint Applied Science program with RRC Polytech in Chemistry is being discontinued. No new students will be accepted to this program.

INTRODUCTION

This is a joint degree program whereby students take courses at both The University of Winnipeg and RRC Polytech in a prescribed sequence.

Students are required to complete courses at both institutions. Students will begin their program of study by completing 60 credit hours of course work at The University of Winnipeg. The next 30 credit hours are completed at RRC Polytech and then students return to The University of Winnipeg to complete the final 30 credit hours. Students successfully completing the entire program will receive a joint degree parchment from RRC Polytech and The University of Winnipeg. **N.B. Transfer of courses between institutions applies only to students who are officially registered in the joint program.**

ADMISSION REQUIREMENT	Students must meet the entrance requirements for admission to The University of Winnipeg. Applications to the program in Applied Chemistry must be completed through the Admissions Office of The University of Winnipeg by March 1 st in order to enter the program in September.
GRADUATION REQUIREMENT	120 credit hours, that is, 90 credit hours meeting the requirements for the BSc General plus 30 additional credit hours.
RESIDENCE REQUIREMENT Degree: Major:	Minimum 60 credit hours Minimum 30 credit hours
GENERAL DEGREE REQUIREMENT Humanities: Writing: Indigenous: Maximum Introductory Courses:	12 credit hours in Humanities. Minimum 3 credit hours of Academic Writing. 3 credit hours in designated Indigenous requirement courses Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 78 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses.
Distribution:	Minimum three (3) credit hours from each of five (5) different subjects.

Required Cou	rses:	(These are the Core courses for all Applied Chemistry BSc students)			
UW COURSES					
CHEM-1111(3)	Introduction to the C of Matter	Chemical Properties	CHEM-4303 (3)	Analytical Separations	
CHEM-1112(3)	Basic Principles of (Chemical Reactivity			
CHEM-2102(3)	Thermodynamics a	nd Kinetics	PLUS		
CHEM-2103(3)	Atoms, Molecules a	nd Spectroscopy	BIOL-1115(3)	Cells and Cellular Process	
CHEM-2202(3)	Organic Chemistry	I	BIOL-1116(3)	Evolution, Ecology and Biodiversity	
CHEM-2203(3)	Organic Chemistry	11	RHET-1103(3)	Academic Writing: Sciences	
CHEM-2302(3)	Quantitative Chemic	cal Analysis	MATH-1101(6)	Introduction to Calculus	
CHEM-2401(3)	Inorganic Chemistry	/1	OR MATH-1	1103(3) Introduction to Calculus I	
CHEM-3302(3)	Methods of Chemic	al Analysis	AND M	ATH-1104(3) Introduction to Calculus II	
CHEM-3401(3)	Inorganic Chemistry	/ II: Coordination	PHYS-1301(6)	Introduction to Physics	
	Chemistry		PLUS		
CHEM-3601(3)	Environmental Cher	mistry	12 Credit hours H	lumanities	
CHEM-4302(3)	Instrumentation for	Quantitative	18 Credit hours E	Electives	
	Analysis				
RRC COURSES					
CBST-1014	Microbiology 1				
CBST-1025	Data Analysis				
CBST-1031	Introductory Biochemi	strv			
CBST-1040	Quality Systems				
CBST-1041	Regulatory Compliance	e			
CBST-1070	Principles of Hazardou	_ us Materials			
	Management				
CBST-1090	Introductory Statistics				
CBST-2017	Microbiology 2				

 CBST-3001
 Advanced Biochemistry

 ENVI-1011
 Environmental Chemistry/Toxicology

The following pattern of courses is suggested:

4-Year Program				
Year 1 - University of Winnipeg		Year 2 - University of Winnipeg		
CHEM-1111(3) Introduction to the Chemical Properties of Matter CHEM-1112(3) Basic Principles of Chemical Reactivity BIOL-1115(3) Cells and Cellular Processes BIOL-1116(3) Evolution, Ecology and Biodiversity RHET-1103(3) Academic Writing: Sciences MATH-1101(6) Introduction to Calculus OR the equivalent MATH-1103(3) Introduction to Calculus I AND MATH-1104(3) PHYS-1301(6) Introduction to Physics 3 Credit hours Humanities		CHEM-2102(3)Thermodynamics and KineticsCHEM-2103(3)Atoms, Molecules and SpectroscopyCHEM-2202(3)Organic Chemistry ICHEM-2203(3)Organic Chemistry IICHEM-2302(3)Quantitative Chemical AnalysisCHEM-3302(3)Methods of Chemical Analysis6 Credit hours Electives6 Credit hours Humanities		
Year 3 – RRC Polytech		Year 4 - University of Winnipeg		
CBST-1014 CBST-1025 CBST-1031 CBST-1040 CBST-1041 CBST-1070 CBST-1090 CBST-2017 CBST-3001 ENVI-1011	Microbiology 1 Data Analysis Introductory Biochemistry Quality Systems Regulatory Compliance Principles of Hazardous Materials Management Introductory Statistics Microbiology 2 Advanced Biochemistry Environmental Chemistry/Toxicology	CHEM-2401(3) CHEM-3401(3) CHEM-3601(3) CHEM-4302(3) CHEM-4303 (3) 3 Credit hours Hu 12 Credit hours E	Inorganic Chemistry I Inorganic Chemistry II: Coordination Chemistry Environmental Chemistry Instrumentation for Quantitative Analysis Analytical Separations umanities Electives	

COURSE LISTINGS

Students should consult Web Advisor or the appropriate Timetable on the website for courses to be offered in the upcoming term. <u>A</u> <u>number of senior courses are offered on a rotation basis and are given in alternate years.</u> Students are advised to consult with the Department <u>in advance</u> when planning their curriculum.

CHEM-0100(3) CHEM-1111(3)	Foundations of Chemistry Introduction to the Chemical Properties of Matter	CHEM-3206(3) CHEM-3302(3) CHEM-3401(3)	Advanced Organic Chemistry Laboratory Methods of Chemical Analysis Inorranic Chemistry II: Coordination
CHEM-1112(3)	Basic Principles of Chemical Reactivity		Chemistry
CHEM-2102(3)	Thermodynamics and Kinetics	CHEM-3502(3)	Intermediate Biochemistry I: Structure,
CHEM-2103(3)	Atoms, Molecules and Spectroscopy		Function, and Energetics of Biomolecules
CHEM-2202(3)	Organic Chemistry I	CHEM-3503(3)	Intermediate Biochemistry II: Intermediary
CHEM-2203(3)	Organic Chemistry II		Metabolism
CHEM-2302(3)	Quantitative Chemical Analysis	CHEM-3601(3)	Environmental Chemistry
CHEM-2401(3)	Inorganic Chemistry I	CHEM/ENV-361	1(3) Environmental Toxicology
CHEM-2502(3)	Introduction to Biochemistry	CHEM-3701(3)	Directed Studies in Chemistry
CHEM-2701(3)	Computer Techniques and Applications for	CHEM-4101(3)	Quantum Chemistry
	Chemistry	CHEM-4204(3)	Medicinal Chemistry
CHEM-2801(3)	Environmental Issues: A Chemistry	CHEM-4302(3)	Instrumentation for Quantitative Analysis
	Perspective	CHEM-4303(3)	Analytical Separations
CHEM-3101(3)	Physical Chemistry of Condensed Phases	CHEM-4401(3)	Organometallic d-Block Chemistry
CHEM-3102(3)	Quantum Chemistry and Spectroscopy	CHEM-4403(3)	Advanced Main Group Chemistry
CHEM-3202(3)	Reaction Mechanisms in Organic	CHEM-4502(3)	Molecular Enzymology
	Chemistry	CHEM-4506(3)	Methods in Biochemistry
CHEM-3204(3)	Organic Structure Determination	CHEM-4701(6)	Research Projects in Chemistry
CHEM-3205(3)	Organic Synthesis	CHEM-4703(3)	Topics in Chemistry

EXPERIMENTAL COURSE LISTINGS

CHEM-3504(3) Plant Biochemistry

COURSE DESCRIPTIONS

All course descriptions for all undergraduate programs can now be found in one large PDF called "All Course Descriptions" in the "Academic Calendar" section of the University website: http://uwinnipeg.ca/academics/calendar/index.html