

CHEM 233 – Physical Chemistry

General Information - 2007

SUMMARY OF COURSE CONTENT

The topics covered by this course are:

- Properties of Gases
- Thermodynamics
- Chemical Kinetics
- Ionic Solutions

THIS COURSE IN CONTEXT

This course is presented in the first semester only. It counts 12 points towards a Bachelor of Science degree and preferably should be taken in conjunction with other 200-level chemistry courses. The 200-level laboratory course that is most relevant to this course is CHEM 282. **CHEM 233 is a required course for entry into a BSc(Hons) and MSc programmes in Chemistry.**

Prerequisites: CHEM 111 or CHEM 113 or CHEM 121

Recommended Preparation: MATH101 or MATH109

Course Co-ordinator: Dr Colin Freeman (Room 630)

General enquiries about 200-level courses should be directed either to the 200-level course coordinator (Prof Murray Munro, Room 758), or to the Head of Department (Prof Bryce Williamson, Room 530).

LECTURES AND LECTURERS

Lectures will be held on Tuesdays and Fridays at 10.00am in Room S6. Lectures will be given by:

Assoc Prof Greg Russell Phone 364 2458, Room 634
e-mail: *greg.russell@canterbury.ac.nz*

Dr Colin Freeman Phone 364 2453, Room 630
e-mail: *colin.freeman@canterbury.ac.nz*

The order of lecturing is: Russell (4), Freeman (5), Russell (8), Freeman (6).

TUTORIALS

Tutorials have been scheduled for Thursdays at 10.00 am and Fridays at 1.10 pm in Room 431 of the Department of Chemistry. Other times may be arranged if necessary.

ASSESSMENT

- Mid-Semester Test 25%
- Final examination 50%
- Problems/Tutorial Work 25%

MARKS AND GRADES

The following numbers should be considered as a guide to the expected grades under normal circumstances. The Department reserves the right to adjust mark/grade conversions, if necessary. This will occur only where statistical analysis of marks indicates that the numerical distribution, and subsequently arising grades, is anomalous. Any such adjustments will **not** be made to the detriment of students' grades.

Grade:	A+	A	A-	B+	B	B-	C+	C	C-	D	E
Minimum mark %:	85	80	75	70	65	60	55	50	48	40	0

MID-SEMESTER TEST: 1 HOUR

Test details: 8 May 7.00 – 8.00 pm S5

A 1-hour test to be arranged for an evening or Saturday morning of the first week following the mid-semester break. The 1-hour mid-semester test will contribute 25% to the overall grade and will cover specified lecture material up to the semester break. This material may be re-examined in the final examination.

Note that performance in this test will be the main criterion for assessing aegrotat applications in the event of illness during the final examination.

FINAL EXAMINATION: 2 HOURS

Exam details: Monday, 18 June 2.30 – 4.30 p.m.

The final examination will contribute 50% of the overall grade and will cover all the lecture material of the course.

TUTORIAL ASSESSMENT

25% of the total assessment of this course will be associated with tutorials, which will be taken by the current lecturer at that time. The assessment will be based on problems and/or assignments that will be set in tutorials. The format may vary between lecturers, and it may take the form of short quizzes. Some of the assessment may be based on regular attendance at tutorial classes.

TEXTBOOK

P. W. Atkins and J. de Paulo, *The Elements of Physical Chemistry* (4th Ed).

This text covers most of the material of this course. References to the appropriate sections of the text will be detailed by each lecturer. The book also contains many helpful worked examples and tutorial problems. This text will also be useful for those intending to enrol in CHEM 243.

Students intending to enter the BSc(Hons) programme (CHEM 273) or intending to enrol in advanced physical chemistry courses (300-level in future years) are advised to use P.W. Atkins and J. de Paulo, *Atkins' Physical Chemistry* (8th Ed.)

All students should have one of the above textbooks or regular access to a copy. (Copies may be available on short term loan from the Physical Sciences Library.)

CHEMISTRY DEPARTMENT POLICY ON 'DISHONEST PRACTICE'

The University has strict guidelines regarding 'dishonest practice' and 'breach of instructions' in relation to the completion and submission of examinable material. In cases where dishonest practice is involved in tests or other work submitted for credit a department may choose to not mark such work (2007 Calendar, p 81 and pp 351 – 2 of 2007 Enrolment Handbook under the Headings 'Cheating' and 'Discipline').

The Department of Chemistry upholds this policy. It considers plagiarism, collusion, copying, and ghost writing to be unacceptable and dishonest practices:

- **Plagiarism** is the presentation of any material (text, data or figures, on any medium including computer files) from any other source without clear and adequate acknowledgement of the source.
- **Collusion** is the presentation of work performed in whole, or in part, in conjunction with another person or persons, but submitted as if it has been completed by the named author alone. This interpretation is not intended to discourage students from having discussions about how to approach an assigned task and incorporating general ideas that come from those discussions into their own individual submissions, but acknowledgement is necessary.
- **Copying** is the use of material (in any medium, including computer files) produced by another person or persons with or without their knowledge and approval.
- **Ghost writing** is the use of other person(s) (with, or without payment) to prepare all or part of an item of work submitted for assessment.

ADDITIONAL INFORMATION

Aegrotat applications: If you feel that illness, injury, bereavement or other critical circumstances has prevented you from completing an item of assessment or affected your performance, you should complete an aegrotat application form, available from the Registry or the Student Health and Counselling Service. This should be done **within seven days** of the due date for the required work or the date of the examination. In the case of illness or injury, medical consultation should normally have taken place shortly before or within 24 hours after the due date for the required work, or the date of the test or examination. For further details on aegrotat applications, please refer to pages 351 and 353 of the University's 2007 Enrolment Handbook.

Missing of tests: In rare cases a student will not be able to sit a test because of involvement in representative sport or cultural groups. In such cases the student should consult the Course Coordinator and the Head of Department, and a course of action (usually the sitting of an equivalent test at a different time) will be arranged. **This should be done well in advance of the set date for the test.**

Submission of reports and assignments: Reports and assignments should be handed in on time. Extensions will be granted only in exceptional circumstances (such as illness or bereavement). If an extension is required, as early as possible you should request it from the lecturer concerned.

Note: If you do not submit an assignment for assessment, you will be allotted zero marks, which will affect your final result. You should ensure that you pick up marked assignments and keep them until the end of the course as evidence that the work was completed and marked in the case that either is disputed. To guard against accidental loss, it would be prudent to keep photocopies or electronic copies of anything submitted.

Academic liaison: Prof Murray Munro (Room 758, phone 364 2434) is the coordinator of 200-level and 300-level chemistry courses. His interest is in the academic performance and well-being of all such students. Anyone experiencing problems with their 200-level chemistry courses or requiring guidance about their B.Sc. in Chemistry should get in contact with Prof Munro.

Liaison committee: There is a small staff-student liaison committee that includes a representative from each of the second, third and fourth year classes. Student representatives will be selected from each class early in the first term.

Computer equipment: The University provides several student computer facilities. There is also a suite of PCs in Room 540 on the 5th floor of the Chemistry Department which 200-level chemistry students are welcome to use for chemistry assignments and laboratory exercises OUTSIDE THE TIMES WHEN THESE COMPUTERS ARE NEEDED FOR THE CHEM 282 and 382 LABORATORY COURSES. Commonly used programs such as Word and Excel have been loaded onto these PCs.

Please note that these computers are provided for your use in Chemistry courses only and are not to be used for work for other departments. Abuse of this privilege will result in access to the computers being denied.

Bryce E. Williamson
Head of Department
February 2007

CHEM 233

Physical Chemistry

Course Content - 2007

Physical chemistry provides the basic principles for understanding and explaining the observations made in all branches of chemistry. The foundations of physical chemistry are the laws of thermodynamics, kinetics and quantum mechanics. CHEM 233 can be regarded as a direct extension of first-year chemistry, expanding on the concepts of thermodynamics and kinetics. Some new material is introduced on the application of gas laws. Advanced thermodynamics, quantum mechanics and spectroscopy are covered in CHEM 243 and CHEM 273.

Assoc Prof Greg Russell (Room 634) (4 lectures)

Introductory Physical Chemistry: Measurement and units. Properties of gases, perfect gas law, kinetic theory of gases.

Dr Colin Freeman (Room 630) (5 lectures)

Chemical Kinetics: Reaction rates and rate laws, experimental measurements and uses of rate constants, elementary versus complex reactions, steady-state method, kinetics and mechanisms, effect of temperature on reaction rate, introduction to collision theory and transition-state theory.

Assoc Prof Greg Russell (Room 634) (8 lectures)

Thermodynamics: Topics include: work, heat, internal energy, enthalpy, heat capacity and the first law; thermochemistry (including Hess's law and Kirchhoff's law), applied to both physical and chemical change; entropy as a driving force, the second and third laws, and Gibbs free energy; the uses of standard data tables.

Dr Colin Freeman (Room 630) (6 lectures)

Chemical Kinetics: Completion of topics listed above (ca. 2 lectures).

Ionic Solutions: the nature of ionic solutions; conductance and transport number, conductimetric titrations, equilibrium constants from conductance measurements.