

CHEMISTRY

Head of Department and Professor of Organic Chemistry & Nanomaterials

RWM Krause, BSc(Hons)(Wits), PhD(Wits)

DST/NRF Professor of Medicinal Chemistry and Nanotechnology, Director: DST/

Mintek Nanotechnology Innovation Centre, Distinguished Professor, Rhodes University

T Nyokong, BSc(Lesotho), MSc(McMaster), PhD (Western Ontario), OMB, FRSSAf, FRSC

Director, Centre for Chemico- and Biomedical Research CCBR

Professor Emeritus PT Kaye, BSc(Natal), BSc(Hons)(UNISA), MSc(Natal), DPhil(Oxon), FRSC, FRSSAf

Professor of Analytical Chemistry

To be appointed.

Associate Professor, Inorganic & Analytical Chemistry

GM Watkins, PhD(UCT)

Senior Lecturer, Physical Organic Chemistry

KA Lobb, PhD(Rhodes)

Senior Lecturer, Organic Chemistry

R Klein, BSc(Hons)(UCT), MSc(Rhodes), PhD(Miami)

Senior Lecturer, Inorganic Chemistry

PN Mashazi, BSc(Hons), MSc(Rhodes), PhD(Rhodes)

Senior Lecturer, Academic Development

JD Sewry, MSc(Rhodes), HDE(UNISA)

Lecturer, General & Inorganic Chemistry

SD Khanye, BSc(Hons)(WITS), MSc(WITS), PhD(UCT)

Senior Lecturer, Physical Chemistry

MS Khene, BSc(Hons)(Rhodes), MSc(Rhodes), PhD(Rhodes)

Senior Scientist and NMR Specialist

P Kempgens, BSc, MSc, PhD(University Louis Pasteur, Strasbourg France)

Manager and Senior Researcher of the Rhodes/DST Centre for Nanotechnology Innovation

J Britton, BSc, PhD (Rhodes)

Nanotechnology Specialist and Senior

Researcher of the Rhodes/DST Centre for Nanotechnology Innovation

J Mack, BSc(Hons)(Aberdeen University, Scotland), PhD(Western Ontario)

Research Associates

Professor Emeritus ME Brown, BSc(Hons)(Wits), DSc(Rhodes), FRSSAf

AK Galwey, DSc(London)

DR Rosseinsky, MSc(Rhodes), PhD, DSc(Manch), FRSC CChem

C Litwinski, PhD(Humboldt-Berlin)

Professor N Torto, BSc(Hons)(Manchester),

MSc(Botswana), PhD(Lund), FRSC

Associate Professor Z Tshentu, PhD(NMMU)

E Antunes, PhD(Rhodes)

Chemistry (CHE) is a six-semester subject which may be taken as a major subject for the degrees of BSc, BCom and BJur. To major in Chemistry, a candidate is required to obtain credits in CHE 1; CHE 2; CHE 3; and two semester credits, normally comprised of one full first year course in any of Computer Science, Mathematics, Physics and Statistics. Students are advised to discuss their choice of the above courses with the Head of the Chemistry Department. Students are also referred to the relevant Departmental Calendar sections that limit entry into CSC 102, PHY 102 and STA 102 to those performing satisfactorily in the corresponding 101 courses. See also Rule S.23. Two, or in some cases four, Chemistry semester credit courses are allowed as credits for other degree/diploma curricula in the Faculties of Humanities and Education. In particular, credits in CHE 101 and CHE 102 separately, or an aggregated credit CHE 1, are required for admission to BPharm 2, provided that a candidate obtains the required sub-minimum in the theory section of each course separately. Each undergraduate year is offered as a pair of semester-credit courses. Credit in any semester-course is subject to a sub-minimum in the theory paper/s.

See the Departmental Web Page

<http://www.ru.ac.za/Chemistry> for further details, particularly the content of courses.

First-year level courses in Chemistry

4 lectures, 1 tutorial and 3 hours of practical weekly.

Note: Students in Chemistry in 101 are expected to have a knowledge of chemistry at the standard of Physical Science in the National Senior Certificate.

There are two first-year courses in Chemistry. CHE 101 is offered in the first semester and CHE 102 in the second semester. Credit may be obtained in each course separately and, in addition, an aggregate mark of at least 50% will be deemed to be equivalent to a

two-credit course CHE 1, provided that a candidate obtains the required sub-minimum (40%) in the theory papers of each course separately. Supplementary examinations may be recommended in either course, provided that a candidate achieves a minimum standard specified by the Department.

Continuation Requirements

Candidates obtaining less than 20% in the theory paper of CHE 101 in June are not permitted to continue with any Chemistry course in that year. A mark of at least 40% in the theory paper of CHE 101 is required for entry into CHE 102. Candidates who achieve this standard, but fail to obtain at least 50% overall, may join the CHE 102 course in July, but must re-write the CHE 101 paper, in addition to the CHE 102 paper, in November. The higher of the two marks for the CHE 101 papers will count (see Rule S.25.5). Candidates who obtain from 20% to 39% in the theory paper of CHE 101 in June cannot continue into CHE 102. They must transfer to the remedial course, Chemistry 1R1, to revise the topics from CHE 101 for re-examination in November, but will continue with the CHE 102 practical course. In the following year, candidates with a credit for CHE 101 or 1R1 (but not for CHE 102) must register for CHE 1R2 in the first semester and if they pass the course requirements satisfactorily in June, will obtain a credit for CHE 1R2, which is equivalent to a credit in CHE 102. Those students who fail the CHE 1R2 examination in June will proceed into the mainstream CHE 102 in the second semester, and rewrite the CHE 102 paper in November.

CHE 101 (first semester):

Chemical symbols and numeracy, nuclear chemistry, atomic structure and bonding, chemical and physical equilibrium, introduction to organic chemistry.

CHE 102 (second semester):

Properties of inorganic systems, atmospheric and environmental chemistry, organic functional group chemistry, biological building blocks, reaction rates, chemical thermodynamics, electrochemistry.

Second-year level courses in Chemistry

This comprises 5 lectures and 4.5 hours of practical work weekly with an additional 0.5 hours tutorial every second week. There are two independent second-year courses in Chemistry. CHE 201 is offered in the first semester and CHE 202 in the

second semester. Credit may be obtained in each course separately and, in addition, an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course CHE 2, provided that a candidate obtains the required sub-minimum in the theory paper of each course separately. No supplementary examinations will be offered for either course. Credit in Chemistry (CHE 1) is required before a student may register for CHE 201 or CHE 202.

CHE 201 (first semester):

Sampling and Sample Handling
Statistics for Analytical Chemistry
Classical Methods of Analysis
Principles; Spectroscopic methods: UV, IR, ^1H - and ^{13}C - NMR, MS, Atomic absorption/emission;
Electroanalytical techniques; Chromatography
Analytical Chemistry Practicals and Projects

CHE 202 (second semester):

Fossil fuels and organic chemistry
Feedstocks and reactions
Reactions of alkenes, alkynes and carbonyls;
Cycloalkanes: stereochemistry and synthesis;
Aromatic Chemistry: reactions, mechanisms; orientation effects; heterocycles.
Polymer Chemistry: Natural and Synthetic polymers;
Chemical Thermodynamics including environmental aspects
Chemical kinetics of complex reactions including polymerization
Inorganic Chemistry: Periodic Trends
Practical: Physical, organic and polymer chemistry.

Third-year level courses in Chemistry

This consists of 5 lectures and 4.5 hours of practical weekly. There are two independent third-year courses in Chemistry. CHE 301 is held in the first semester and CHE 302 in the second semester. Credit may be obtained in each course separately and, in addition, an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course CHE 3, provided that a candidate obtains the required sub-minimum in the theory paper of each course separately. No supplementary examinations will be offered for either course.

Credits in Chemistry (CHE 2), and two semester credits, normally comprised of one full first year course in any of Computer Science, Mathematics,

Physics and Statistics, are required before a student may register for CHE 301 or CHE 302. Students are referred to the relevant departmental Calendar sections that limit entry into CSC 102, PHY 102 and STA 102 to those performing satisfactorily in the corresponding 101 courses. Note also that the university timetable may prevent certain first year courses from being taken concurrently with Chemistry 3. See also Rule S.23.

CHE 301 (first semester):

Organic Synthesis; Retrosynthesis; Green Chemistry; Quantum Mechanics and Molecular Modelling; Bioinorganic Chemistry; Photochemistry, PDT and Medicinal Chemistry; Nanotechnology.

Practical: Physical and Organic chemistry.

CHE 302 (second semester):

Linear Free Energy; Advanced Chromatography; Transition Metal Chemistry; Kinetics; Crystallography; Organometallic Chemistry; Energetics.

Practical: Research internship and Inorganic chemistry.

Chemistry Honours

Students who achieve a satisfactory standard in Chemistry 3 (normally 60% or above) may be accepted for the Honours course. The Honours course consists of lectures on a choice of advanced topics, a review essay and a research project (conducted over most of the year as a member of one of the Department's research groups).

Master's and Doctoral degrees

Suitably qualified students are encouraged to proceed to the research degrees of MSc and PhD under the direction of the staff of the Department. Requirements for the MSc and PhD degrees are given in the General Rules.

CLASSICAL STUDIES

(SEE LANGUAGES (SCHOOL OF))