



GENERAL INFORMATION FOR
POSTGRADUATE **BOTANY** STUDENTS

2010



Department of Botany

Table of Contents

	Page
1. Objectives of the Botany Department	2
2. Staff	3
3. Almanac	5
4. Postgraduate studies	6
4.1 Honours modules	6
BOT410 – Botanical techniques	7
BOT420 – Selected topic 1	11
BOT430 – Selected topic 2	11
BOT440 – Selected topic 3	12
BOT450 – Project 1	12
BOT460 – Project 2	12
BOT470 – Oral examination	13
BOT400 – Overall mark	13
4.2 Master’s programme	14
4.3 Doctoral programme	17
5. Safety, Health and Environment instructions for postgraduate laboratories.	20
6. Admission requirements	29
7. Departmental Equipment	30
7.1 Laboratories	32
7.2 Glasshouse	32
7.3 Cold rooms	32
7.4 Growth cabinets	33
7.5 Computers	33
7.6 GIS lab	33
7.7 Image analyser	33
7.8 Maps	33
7.9 Vehicles	34
7.10 Technical Assistance	34
8. Copyright	35
9. Guidelines on research and scientific writing	37
9.1 Written presentations	37
9.2 Oral presentations	42
9.3 Powerpoint presentations	44
10. ICT Usage	46
10.1 Responsibilities	47

Welcome to the Department of Botany. We hope that you will have a good year with us and that you will achieve your academic goals.

This booklet contains the information you will need to organise your botanical studies for the year. It also contains vital information pertaining to deadlines, policies, safety and academic support. It is in your interest to work through most of this document.

1. Objectives of the Botany Department

The Department of Botany is committed to guide you in the acquisition of scientific skills and insights. We strive for excellence in academic achievement and purposeful research.

We aim to assist you to develop:

- An understanding of concepts and principles as well as acquired knowledge in science - particularly Botany;
- The ability to use scientific knowledge and skills to solve problems in innovative ways, using appropriate principles, tools, techniques, methodology and logical reasoning;
- Skills used to investigate phenomena related to Botany and science and to understand the changing and contested nature of knowledge in science;
- The ability to use oral and written modes of communication through the effective preparation, organisation and presentation of research;
- The ability to use science and technology effectively, critically and safely, while showing responsibility to the environment and the health of others;
- An understanding of the world through integration of knowledge and skills;
- The ability to transfer knowledge across contexts;
- The ability to work effectively in a team, collaborating to develop commitment, respect, shared responsibility, interpersonal relationships and managerial skills in order to achieve a set purpose.

2. Staff

At University, you are a student and not a pupil. The academic staff are not your adversaries. This means that you are a partner in your own education and not a reluctant bystander. The success of your studies depends on **your contribution** and not on the authoritarian discipline of the lecturers. Remember that the lecturers need your respect, cooperation and participation as much as you need theirs. Mutual consideration between students and lecturers will result in effective education. Try to be considerate of the lecturers and other students. The whole system will work better that way.

The Botany staff who will interact with you are:

Prof E E Campbell

Head of Department

Associate Professor

Herbarium Curator

Office: 12 01 07

Telephone: 504 2397

E-mail: eileen.campbell@nmmu.ac.za

Subjects taught: ecology, systematics and phycology

Research interests: phycology, restoration ecology

Ms A Packareysammy

Departmental Secretary

Office: 12 01 07

Telephone: 504 2397

E-mail: aziza.packareysammy@nmmu.ac.za

Prof J B Adams

Professor

Office: 12 01 03

Telephone: 504 2429

E-mail: janine.adams@nmmu.ac.za

Subjects taught: ecology and stress physiology

Research interests: estuarine ecology and management

Dr D R du Preez

Director of the School of Environmental Sciences
Director of the Unit for Integrated Environmental and Coastal Management
Senior Lecturer
Office: 12 0G 21
Telephone: 504 2721
E-mail: derek.dupreez@nmmu.ac.za
Subjects taught: cytology, physiology and phycology, GIS
Research interests: algal physiology, ecophysiology and mariculture

Dr P T Gama

Senior Lecturer
Office: 12 01 05
Telephone: 504 2779
E-mail: phumelele.gama@nmmu.ac.za
Subjects taught: anatomy, morphology, ecophysiology and phycology
Research interests: phytoplankton ecophysiology

Ms A Rajkaran

Contract Lecturer
Office: 12 01 18
Telephone: 504 2648
E-mail: anusha.rajkaran@nmmu.ac.za
Subjects taught: ecology, taxonomy
Research interests: mangrove ecology, population modelling

Mr A C Smith

Technician - Practicals
Office: 12 0G 08
Telephone: 504 2196
E-mail: andrew.smith@nmmu.ac.za

Prof R M Cowling

Non-lecturing Research Professor
Office: 12 01 14
Research interests: plant diversity and conservation ecology

3. Almanac

Dates: _____ **Last date for registration:**

Term 1: 1 February to 19 March	5 March
Term 2: 23 March to 20 May	30 March
Term 3: 19 July to 3 September	2 August
Term 4: 6 September to 29 October	10 September

Autumn Recess: 2 – 11 April

Winter Recess: 12 June – 18 July

Spring Recess: 24 September – 3 October

Summer Recess starts: 27 November

Exams (terms 1 & 2): 24 May to 11 June

Exams (terms 3 & 4): 3 to 26 November

Public Holidays

Fri	1 January	New Year's Day
Sun	21 March	Human Rights Day
Mon	22 March	Public Holiday
Fri	2 April	Good Friday
Mon	5 April	Family Day
Mon	26 April	Public Holiday
Tue	27 April	Freedom Day
Sat	1 May	Workers Day
Wed	16 June	Youth Day
Mon	9 August	Women's Day
Fri	24 September	Heritage Day
Thu	16 December	Day of Reconciliation
Sat	25 December	Christmas Day
Sun	26 December	Day of Goodwill
Mon	27 December	Public Holiday

4. Postgraduate studies

Postgraduate students are considered to be members of staff. As such, they should feel free to participate in all departmental staff functions.

Seminars

Departmental seminars are held at **12h00** on Mondays. Attendance of these is **compulsory** for all postgraduate students. Postgraduate students should plan their activities, including research trips, so that they are available to attend seminars at this time. Undergraduate students are welcome to attend.

Time management

At postgraduate level, you are expected to have time management skills. Please be considerate of your supervisor/s or promoter/s. It is not reasonable to expect them to give up their departmental duties or their responsibilities to other students at your request.

Bursaries

Information on postgraduate student bursaries may be obtained from the Research Office: MB1308.

4.1 Honours modules

Botany Honours begins on Monday, 1 February and continues until the second project is submitted on Friday, 26 November.

The examinable component of honours is based on reading, essays, tutorial sessions, seminars and practical projects. Should students experience any problems they should consult a member of the academic staff. However, as post-graduate students you are expected to be far more independent than are undergraduate students.

4.1.1 Botany BSc (Hons.) outcomes

Graduates of the programme will:

- H1. Demonstrate an understanding of concepts, principles and acquired knowledge in science – particular Botany – through independent thinking and critical evaluation.
- H2. Use scientific knowledge to design and test hypotheses and skills to solve problems in innovative ways, using appropriate principles, tools, techniques and logical reasoning.
- H3. Develop skills to investigate phenomena related to Botany and demonstrate an understanding of the changing and contested nature of knowledge in science.

- H4. Work effectively in a team, collaborating to develop commitment, respect, shared responsibility, interpersonal relationships and managerial skills, to achieve a set purpose.
- H5. Use oral and written modes of communication effectively in English, through the preparation, organisation and presentation of research.
- H6. Use science and technology effectively, critically and safely, while showing responsibility to the environment and the health of others.
- H7. Demonstrate an understanding of the world through the ability to transfer knowledge across contexts and integrate knowledge and skills.

Graduates of the programme will be aware of:

- H8. A variety of thinking and learning skills.
- H9. Being the consciousness of society in environmental issues.
- H10. Contextualising environmental issues in a cultural and social framework
- H11. The career opportunities available in the many fields that make up the discipline of Botany and their application in the community.
- H12. Entrepreneurial opportunities through exposure to examples of the application of botanical knowledge.

BOT410 – Botanical techniques

Content: Techniques applicable to the selected specialisation field: e.g. statistics, microscopy, surveying, computer usage, and photography.

Lecturers: All

Lectures: 1 February – 19 March

Due date: 19 March for all techniques reports

Credits: 25

Mark allocation (%):

Techniques	40
Field trip report	10
Seminar	
Verbal presentation (20)	
Written presentation (10)	30
Research paper presentation	10
Demonstration	10
Total	100

Techniques common to all selected specialisation fields are statistics, philosophy of science and computer usage. Other techniques relating to different specialisation fields will be added once your interests have been established.

Students must select a **seminar** topic in consultation with a member of the academic staff chosen by the student to act as a supervisor. Topics must be selected early in the first term and approved by a staff meeting. The written part of the seminar should be submitted by **Thursday, 20 May**. Students are expected to work closely with their supervisor regarding the subject matter and content of the selected seminar topic. Dates for the presentation of the seminars will be allocated by the seminar co-ordinator.

Honours students are expected to go on a **field trip** that will last for a week. The cost for the field trip is **R1000** to be paid two weeks before departure. Each student must hand in a written report detailing the aims of, and activities undertaken during the field trip.

Honours students will present a **research paper** on the results from their first project at a symposium held on **Thursday, 7 October**. Honours students will also chair the sessions for the symposium. Please do not make any other arrangements for the day.

Part of the techniques course involves **demonstrating** at undergraduate practicals. These practicals are every Wednesday from 14:00 to 17:00 during term time. Students will be evaluated on their demonstrating performance.

BOT410 schedule 2010

Date	08h30-10h00	10h30-12h00	14h00-15h30
1 Feb		Staff Meeting & Seminar	Orientation
2 Feb	Philosophy of Science	Project Selection	Philosophy of Science
3 Feb	Water quality	Seminar Selection	BEACH PRAC
4 Feb	Computers	Computers	Computers
5 Feb	Computers	Computers	Computers
8 Feb	Microscopy	Staff Meeting & Seminar	
9 Feb	Surveying	Surveying	Surveying
10 Feb		Herbarium	Demonstrating Welcoming Braai
11 Feb	Water quality	Water quality	Water quality
12 Feb	Photography	Photography	Photography
15 Feb	Microscopy	Staff Meeting & Seminar	
16 Feb			
17 Feb		Herbarium	Demonstrating
18 Feb	Equipment	Equipment	Equipment
19 Feb	Surveying	Surveying	Surveying
22 Feb	Microscopy	Staff Meeting & Seminar	
23 Feb			
24 Feb		Herbarium	Demonstrating

25 Feb	Stats	Stats	Stats
26 Feb	Stats	Stats	Stats
1 Mar	Field Trip	Field Trip	Field Trip
2 Mar	Field Trip	Field Trip	Field Trip
3 Mar	Field Trip	Field Trip	Demonstrating (arrange substitute)
4 Mar	Field Trip	Field Trip	Field Trip
5 Mar	Field Trip	Field Trip	Field Trip
8 Mar		Staff Meeting & Seminar	
9 Mar		Stats	
10 Mar		Stats	Demonstrating
11 Mar	Stats	Stats	Stats
12 Mar	Stats	Stats	Stats
15 Mar		Staff Meeting & Seminar	
16 Mar			
17 Mar			Demonstrating
18 Mar			
19 Mar	Stats Exam	Stats Exam	Stats Exam

Prof Campbell (Herbarium, Microscopy, Statistics)

Dr Du Preez (Philosophy of Science, Computers)

Dr Gama (Water quality)

Mr Smith (Equipment)

Ms Rajkaran (Photography, Surveying)

BOT420, 430 and 440 – Selected topics 1-3

Content: Aspects of a specialisation field selected by the student in consultation with the department. Students may choose from the following specialisation fields for their selected topics:

- Conservation Biology
- Ecology
- Environmental Management
- Marine Botany
- Plant Physiology
- Systematic Botany

Details of the contents of these topics will be fixed after consultation with the students to accommodate their special interests.

BOT420 – Selected topic 1

Week 1 – 23 to 29 March

Week 2 – 12 to 16 April

Week 3 – 19 to 23 April

Week 4 – 3 to 7 May

Week 5 – 10 to 14 May

Week 6 – 17 to 21 May

Examination: 31 May @ 09h00

Exam hours: 3

Credits: 15

BOT430 – Selected topic 2

Week 1 – 19 to 23 July

Week 2 – 26 to 30 July

Week 3 – 2 to 6 August

Week 4 – 10 to 16 August

Week 5 – 17 to 23 August

Week 6 – 24 to 30 August

Examination: 3 November @ 09h00

Exam hours: 3

Credits: 15

BOT440 – Selected topic 3

Week 1 – 6 to 10 September

Week 2 – 13 to 17 September

Week 3 – 4 to 8 October

Week 4 – 11 to 15 October

Week 5 – 18 to 22 October

Week 6 – 25 to 29 October

Examination: 8 November @ oghoo

Exam hours: 3

Credits: 15

Two special topics are offered as selected topics 3 and 4 respectively and may be taken with any specialisation field:

Landscape ecology and GIS (Term 3)

Environmental management procedures (Term 4)

BOT450 – Project 1

Content: A research project chosen in consultation with the Department.

Lecturer: Supervisor

Due date: 19 July

Credits: 22

The topic for the project must be chosen in consultation with a member of staff who will act as supervisor. Students are required to work closely with the supervisor in the design, execution and presentation of the study. A student will only be permitted to begin the research project after submission of an acceptable project proposal.

Candidates will be required to submit a draft of their projects to the supervisor for editing and comment before submission of the final product.

Please submit **two** final copies of each project: one to the supervisor and one to the head of department. If you wish to keep a copy for yourself then a third copy must be made.

See section 7 for recommendations on how to conduct, record and present scientific research.

BOT460 – Project 2

Content: As for BOT450

Lecturer: Supervisor (The supervisor may not be the same as for BOT450)

Due date: 26 November

Credits: 23

BOT470 – Oral examination

Content: Defence of project and general knowledge.

An oral examination of candidate by academic staff and the external examiner.

Lecturers: All

Examination date: To be arranged with external examiner

Exam hours: ½

Credits: 5

BOT400 – Overall mark

Calculated to determine whether the degree is awarded *cum laude*.

Mark allocation:

BOT410	25
BOT420	15
BOT430	15
BOT440	15
BOT450	22
BOT460	23
BOT470	5
TOTAL	120

The degree will be awarded *cum laude* if the final mark is 90 or more (75% or more). Should a student fail one or more modules, credits obtained for modules passed may be retained for subsequent years.

4.2 Master's programme

Registration

- Students must register before or on **5 March 2010**.

Requirements

- Students must be registered for at least ONE year.
- Senate (through the Faculty Management Committee) must approve the topic of the dissertation.
- Students must submit a dissertation indicating proficiency in the scientific method. The dissertation should afford evidence that the student is conversant with the literature of the topic chosen.
- See Section 8 for recommendations on how to conduct, record and present scientific research.

Botany MSc outcomes are:

Graduates of the programme will be able to:

- M1. Demonstrate an understanding of research- and topic-related concepts, principles and acquired knowledge in science.
- M2. Demonstrate innovative problem-solving skills to answer questions or prove or disprove hypotheses stated in the situation of concern and problem statement by analysing data collected using quantitative and qualitative methods.
- M3. Demonstrate effective oral and written modes of communication in English by presenting results at conferences, research seminars, journal papers and in a written dissertation, with recognition of intellectual property rights.
- M4. Demonstrate the use of science and technology effectively and critically.
- M5. Demonstrate the ability to transfer the application of knowledge and skills across contexts by using existing studies and knowledge applied to the particular questions or hypotheses involved in a research project.

Graduates of the programme should be able to:

- M6. Demonstrate the ability to work in a team effectively, considerately and responsibly, through effective collaboration with their supervisor(s) and other members of the research team.
- M7. Demonstrate the necessary applied thinking, learning and research skills for the project to be a success.

- M8. Demonstrate learning independence through effective project management skills.
- M9. Motivate how the results of the research are a benefit to society and how recommendations are made responsibly.
- M10. Motivate how the procedures followed in the research process and any recommendations made, demonstrate cultural, social and environmental awareness, where relevant.
- M11. Have a broader understanding of the career opportunities for a scientist in both the industrial and education sectors in order to take advantage of what is on offer.
- M12. Utilise the available opportunities for research opportunities and funding through gaining an understanding of how the academic accreditation system for research works and how to solicit funding from both public and private sector sources.

Supervisor

- Senate (through the Faculty Management Committee) will appoint the supervisor/s of the dissertation. At least one supervisor will be a member of the academic staff at NMMU.
- No dissertation may be submitted without the permission of the supervisor/s. This does not imply approval of the dissertation by the supervisor/s.

Format

- The examination copies should be printed in at least 1½ line spacing on one side of A4 paper.
- The title page of the dissertation should contain the following:
FULL TITLE
FULL NAME OF CANDIDATE
“SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MAGISTER SCIENTIAE IN THE FACULTY OF
SCIENCE AT THE NELSON MANDELA METROPOLITAN
UNIVERSITY”
DATE OF SUBMISSION
NAME OF SUPERVISOR AND CO-SUPERVISOR/S
- The dissertation should contain a summary of no more than 500 words, appearing just after the index.
- The summary should be followed by a list of not more than 10 key words.

- The dissertation must be satisfactory in form and literary presentation, including a full bibliography.
- Examination copies should be securely bound with hard or soft cover.
- Final copies should be securely bound with hard cover.

Examination

- The dissertation must be accompanied by written declaration that the work is that of the student and that the work has not been submitted at another university.
- Three copies of the dissertation must be submitted for examination. A further three bound copies or a digital form (on CD) must be submitted if the dissertation is accepted.
- The supervisor/s and at least one external examiner will examine the thesis.
- The degree may be awarded with distinction (*cum laude*) if all examiners agree to award a mark of 75% or more.
- If a dissertation is rejected, Senate may permit the submission of a revised dissertation.

Due date: End of **first week in January 2011** to graduate April 2011

- Please submit a draft dissertation to your supervisor in November so that s/he can comment before recess starts on 26 November.

Scientific papers

- Candidates are required to submit a draft manuscript of a scientific paper to the head of department at the time of submission of the dissertation.
- The supervisor/s may publish the candidate's work if the candidate has not done so within six months after the awarding of the degree.
- If all or part of the dissertation is published or presented, the candidate must state that it originated in master's studies at the Nelson Mandela Metropolitan University.

4.3 Doctoral programme

Registration

- Students must register before or on **5 March 2010**.

Requirements

- Students must be registered for at least TWO consecutive years.
- Senate (through the Faculty Management Committee) must approve the topic of the thesis.
- Students must submit a thesis that makes a substantial, original contribution to the scientific knowledge and insight into the subject, providing evidence of independent original thought.

Botany PhD outcomes are:

Graduates of the programme will be able to:

- D1. Demonstrate an understanding of research- and topic-related concepts, principles and acquired knowledge in science.
- D2. Demonstrate innovative problem-solving skills to answer questions or prove or disprove hypotheses stated in the situation of concern and problem statement by analysing data collected using quantitative and qualitative methods.
- D3. Demonstrate effective oral and written modes of communication in English by presenting results at conferences, research seminars, journal papers and in a written thesis, with recognition of intellectual property rights.
- D4. Demonstrate the use of science and technology effectively and critically.
- D5. Demonstrate the ability to transfer the application of knowledge and skills across contexts by using existing studies and knowledge applied to the particular questions or hypotheses involved in a research project.

Graduates of the programme should be able to:

- D6. Demonstrate the ability to work in a team effectively, considerately and responsibly, through effective collaboration with their promoter(s) and other members of the research team.
- D7. Demonstrate the necessary applied thinking, learning and research skills for the project to be a success.
- D8. Demonstrate learning independence through effective project management skills.
- D9. Motivate how the results of the research are a benefit to society and how recommendations are made responsibly.

- D10. Motivate how the procedures followed in the research process and any recommendations made, demonstrate cultural, social and environmental awareness, where relevant.
- D11. Have a broader understanding of the career opportunities for a scientist in both the industrial and education sectors in order to take advantage of what is on offer.
- D12. Utilise the available opportunities for research opportunities and funding through gaining an understanding of how the academic accreditation system for research works and how to solicit funding from both public and private sector sources.

Promoter

- Senate (through the Faculty Management Committee) will appoint the promoter/s of the thesis. At least one promoter will be a member of the academic staff at NMMU.
- No thesis may be submitted without the permission of the promoter/s. This does not imply approval of the thesis by the promoter/s.

Format

- The examination copies should be printed in at least 1½ line spacing on A4 paper.
- The title page of the dissertation should contain the following:
FULL TITLE
FULL NAME OF CANDIDATE
“SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF PHILOSOPHIAE DOCTOR IN THE FACULTY
OF SCIENCE AT THE NELSON MANDELA METROPOLITAN
UNIVERSITY”
DATE OF SUBMISSION
NAME OF PROMOTER AND CO-PROMOTER/S
- The thesis should contain a summary of no more than 500 words, appearing just after the index.
- The summary should be followed by a list of not more than 10 key words.
- The thesis must be satisfactory in form and literary presentation, including a full bibliography.
- A thesis may not contain material previously submitted for a degree. Material from publications by the candidate may be embodied in the thesis if referenced.

- Examination copies (1 each per promoter/co-promoters + 2 for externals) should be securely bound with hard or soft cover. After amendments, final copies should be securely bound with hard cover. One final copy is to be submitted to the University, one final copy to each promoter/co-promoter; one copy in acceptable electronic format.

Examination

- The thesis must be accompanied by written declaration that the work is that of the student and that the work has not been submitted at another university.
- Three copies of the thesis must be submitted for examination. A further three bound copies or a digital form (on CD) must be submitted if the dissertation is accepted.
- The supervisor/s and at least two external examiners will examine the thesis.
- No mark is awarded.
- PhD degrees are not awarded with distinction.
- If a thesis is rejected, the candidate may submit an appeal to the Registrar within 21 days for arbitration.

Due date: End of the first week in January 2010 to graduate April 2011

- Please submit a draft thesis to your supervisor early in November so that he/she can comment before recess starts on 26 November.

Scientific papers

- Candidates are required provide evidence of submission of a manuscript of a scientific paper to a journal. This evidence is to be provided to the head of department at the time of submission of the thesis.
- The supervisor/s may publish the candidate's work if the candidate has not done so within six months after the awarding of the degree.
- If all or part of the thesis is published or presented, the candidate must state that it originated in doctoral studies at the Nelson Mandela Metropolitan University.

5. Safety, Health and Environment instructions for postgraduate laboratories.

HEALTH AND SAFETY REPRESENTATIVES

To implement its Health and Safety Policy, the NMMU has trained Health and Safety representatives in order to reduce the risk of accidental injuries to students and staff. These officers ensure that the environment does not pose a threat to those working in the area and that the correct safety procedures are followed **at all times**.

Please refer to the Botany Representative concerning matters of safety: **Chan Visagie. His office is 12 01 18 and his email address is chan.visagie@nmmu.ac.za.**

Requirements of the Occupational Health and Safety Act state briefly that Health and Safety representatives a) review the effectiveness of health and safety measures; b) identify potential hazards and potential major incidents at the workplace; c) examine the causes of incidents at the workplace; d) investigate complaints by any employee relating to that employees health or safety at work; e) make representations to the employer or a health and safety committee on matters arising from the same or make representations to the employer on general matters affecting the health and safety of the employees at the workplace. As postgraduate students, you are considered to be employees according to the Act. The Health and Safety representative has a monthly checklist that must completed to facilitate compliance with the Act.

It is NOT the duty of the Health and Safety representative to carry out the said duties for the employee. Health and Safety representatives are not expected to put their life at risk by taking care of employees hazardous substances. The onus lies with you, as the purchaser/user of a harmful substance, to dispose of said waste, but your Health and Safety representative can assist you with the process. The fact that you are a student does not negate your direct responsibility to health and safety matters, regulations, or procedures!

Your Health and Safety representative also has other duties in the department – these form part of their job description. Any SHE-related actions that you cannot perform must be referred to the Head of Department for assigning to appropriate technical staff.

FIRST AIDERS

Accidents do happen in even the safest environments. Quick action at an accident can prevent the situation from worsening and assist in the speedy recovery of the victim.

Campus Health Services are situated below (basement) the Embizweni building (which is adjacent to the Main Building).

There are notices in the Department informing you of the closest trained First Aider.

GENERAL SAFETY REGULATIONS AND PROCEDURES

Refer to Section 3.16. Safety, Health and Environment instructions for undergraduate laboratories.

SAFETY EQUIPMENT

Fume Hoods²

To ensure your fume hood provides the highest degree of protection, observe the following guidelines:

- Only materials being used in an ongoing experiment should be kept in a fume hood.
- Cluttering the hood will create air flow disturbances.
- Large apparatus inside a hood should be placed upon blocks or legs to allow air to flow underneath.
- Operate the fume hood with the door as low as practical. Reducing the open face will increase the air velocity.
- Work with your hands as far into the hood as possible. At least six inches is recommended.
- Keep your head outside of the hood.
- Avoid cross drafts at the face of the hood. Even pedestrian traffic may be sufficient to cause air turbulence.
- Keep fume hood doors closed when not attended.

Personal Protective Equipment^{1,2,3,5}

Labcoats

Labcoats are to be worn at all times in the laboratory environment where exposure to hazardous reagents could occur. Labcoats must be in good condition (large acid burnt holes are not acceptable) and have long sleeves to protect the arms.

Eye protectors

Safety goggles/face shield must be worn at all times when working with potentially explosive or radioactive reagents. People wearing contact lenses should be encouraged to wear safety goggles at all times when working in the laboratory. Eye safety goggles are hanging in fumehoods in each lab.

Automatic pipetters

Use automatic pipetting devices at all times when working with harmful chemical or biological reagents.

Gloves

Latex gloves provide adequate protection for dilute acids, alcohol, dilute alkali and ketones. They DO NOT provide adequate protection for chlorinated solvents, petroleum based products, hydrocarbons and epoxy resins. The danger when working with such compounds is that they can weaken the glove and allow other toxic compounds to penetrate the skin. Ensure that you purchase gloves appropriate to the research you will be doing.

REAGENTS^{1,4,5}

Storage of Chemicals

- Read the label carefully before using a chemical. More detailed storage information is usually provided by the MSDS (Material Safety Data Sheet). If the chemical you are using does not have an MSDS in the file in the postgraduate lab, download it from the internet:

<http://MSDS.PDC.CORNELL.EDU/>

<http://hazard.com/msds/>.

www.google.com

- No chemicals may be stored in the laboratory. Discuss the storage of your research chemicals with your supervisor.

- Ensure that incompatible chemicals are not used in close proximity to each other.
- Use spill trays under containers of corrosive reagents.
- Flammable liquids must be stored in approved cabinets.
- While working with chemicals, keep the bottles below eye level.

Guidelines for Specific Types of Spills

Flammable and Toxic Liquids

- If fire occurs, alert everyone present and extinguish all flames without endangering yourself or others. If the fire cannot be controlled immediately pull the nearest fire alarm.
- If no flames are evident, pour vermiculite around the perimeter of the spill and then cover the rest of the material. Wear an appropriate respirator if toxic vapours are involved.
- **Respirator station in Biochemistry 3rd floor foyer.** Please notify the SHE representative if the respirator is used as the filters need immediate replacement.
- While wearing gloves resistant to the chemical being handled, scoop up the absorbed spill, place it in a plastic bag, seal it, and place in a labelled container.

Corrosive Liquids

- Alert everyone present. If vapours are being released, clear the area.
- Do not attempt to wipe up a corrosive liquid unless it is very dilute.
- Gloves, boots, apron and eye protection **MUST** be used when neutralizing an extensive corrosive spill. Respiratory protection is required if the liquid releases corrosive vapour or gas.
- Pour the required neutralizing or adsorbing material around the perimeter of the spill, then carefully add water and more neutralizing material to the contained area. Carefully agitate to promote neutralization.
- Use pH paper to verify that all contaminated areas are neutralized and safe to wipe up.
- If an adsorbent (e.g. spill control pillows) is used instead of a neutralizer, scoop up the absorbed spill, place it in a plastic bag, seal it, and then place in a labelled box. If neutralized material contains no toxic heavy metals (e.g. chromium), flush down the drain with plenty of water.

Corrosive Solids

- A spilled corrosive solid (e.g. phosphorous pentachloride or aluminum chloride) should be blanketed with its neutralizing agent, swept up and placed into an open container, and then sprinkled into cold water inside a fume hood.
- Shield against splattering.
- Complete neutralization of the material and then flush it down the drain with plenty of water.

Toxic Solids

- Avoid disturbing such solids (e.g. asbestos and glass wool) that may release toxic dusts. Wet the material thoroughly, then place it in a plastic bag and label it appropriately.

Gases

- In the event of the release of a corrosive gas (e.g. chlorine) or gases that are absorbed through the skin (e.g. hydrogen cyanide), a complete chemical-resistant suit is required in addition to a self-contained breathing apparatus.

Mercury

- If a small amount of mercury is spilled (e.g. broken thermometer), use an aspirator bulb or a mercury sponge to pick up droplets, place the mercury in a container, cover with water, seal it, and label the bottle appropriately.
- To clean up the residual micro-droplets that may have become worked into cracks and other hard-to-clean areas, sprinkle sulphur powder, or commercial products that will form an amalgam with the mercury. Leave for several hours and sweep up solid into a plastic bag,
- Seal it and label it appropriately.
- If a large spill of mercury occurs, the area should be closed off, and a mercury respirator worn during the clean-up. **Close all doors and evacuate building immediately. Notify emergency services via Campus Control (ext 2482).**

HAZARDOUS WASTE DISPOSAL

Waste Minimization

Substitute non-hazardous experimental materials for hazardous ones. For example, use aqueous-based, biodegradable scintillation fluids whenever possible.

Chemical Waste Disposal

All waste materials must be completely and legibly labelled. All waste materials must be packaged in approved containers. Over-filled and/or leaking containers cannot be accepted for disposal. Organic solvents are stored in clearly labelled glass waste bottles in the chemical fume hoods. Do not mix incompatible reagents: they could be potentially explosive. Ether is stored in a waste bottle on its own. Never discharge wastes into the sewer unless you have verified that hazardous waste regulations permit you to do so.

Do not throw the following chemicals down the drain:

- All organic solvents e.g. petroleum ether, benzene, xylene, toluene, paraffin, chloroform, thinners (with the exception of acetone and alcohol in small quantities).
- All oils
- Large volumes of acids and alkali's. Small volumes of diluted acid and alkali's may be disposed of down the drain, with additional water.
- Neat Formaldehyde (formalin)
- Heavy metal salts e.g. mercuric chloride, cadmium, osmium and lead salts
- Radioactive materials – these must be confined to the radiochemistry laboratory
- Resins used in electron microscopy

All other chemicals that may be poured down the drain should be flushed with large volumes of water!

All chemical waste containers must be fully and correctly labelled. Obtain labels from the SHE rep and give the labelled container to the SHE rep who will arrange for removal. Do not mix waste.

The department will pay for disposal of undergraduate practical and project waste, but postgraduate research waste must be paid for by the project budget!

Broken Glassware (Uncontaminated)

Designate and label a waste receptacle for broken glass, separate from other waste bins. Arrange with your SHE rep to have this container emptied as required.

Empty Chemical Reagent Bottles

Remove the cap from the empty bottle and allow volatile materials to evaporate into the fume hood. Rinse the bottles three times with tap water and let dry. Remove or obliterate the label. Discard the uncapped bottle with the regular garbage. Speak to the SHE rep regarding recycling.

General Waste

Please do not use the refuse bins at the end of your lab desk to dispose of heavy substances such as sand or mud. The cleaners cannot pick up such heavy bins. In addition, the weight of such substances breaks the bin holder. Please dispose of such heavy substances in the dumpster standing downstairs (outside our fire escape).

FIRE PREVENTION

NMMU is in the process of drawing up a fire prevention protocol as well as fire fighting procedures. In the interim take note of the following guidelines.

- Quantities of flammable liquids kept on hand in the laboratory should be minimized.
- Use SABS-approved flammable liquid storage cabinets. Doors of these cabinets should be closed and latched at all times. No other materials should be stored in these cabinets.
- Keep flammable liquids away from heat, flame and direct sunlight. No welding or soldering should be performed in their vicinity.
- Static charges can build up in pipes or other apparatus through which organic liquids are flowing. Such equipment should be electrically grounded.
- Smoking is not permitted in laboratories

Refer to Section 3.16. Safety, Health and Environment instructions for undergraduate laboratories for Fire Drill instructions.

GENERAL SAFETY

Use of Compressed Gases

- All gas cylinders, full or empty, should be securely supported using suitable racks, straps, chains or stands.
- When cylinders are not in use or are being transported, remove the regulator and attach the protective cap.
- An appropriate cylinder cart should be used for transporting cylinders. Chain or strap the cylinder to the cart.
- Verify that the regulator is appropriate for the gas being used and the pressure being delivered. Do not rely upon the pressure gauge to indicate the maximum pressure ratings; check the regulator's specifications.
- Do not use adaptors or teflon tape to attach regulators to gas cylinders.
- Never bleed a cylinder completely empty, leave a residual pressure.
- Do not lubricate the high pressure side of an oxygen regulator.
- Do not expose cylinders to temperature extremes.

Cryogenics (Liquid Nitrogen)

Cryogenics present the following hazards:

- asphyxiation due to displacement of oxygen (does not apply to liquid air and oxygen)
- embrittlement of materials from extreme cold
- frostbite
- explosion due to pressure build up

The following are precautions for handling cryogenics:

- Use only low pressure containers equipped with loose lids. Do not tape the lid to a liquid nitrogen container in an attempt to prevent it from evaporating!
- Protect skin and eyes from contact by using full face masks and cryo gloves.

If you do accidentally get frost bite do not try and rapidly thaw the tissue by heat and do not rub the area as this will damage or remove the underlying tissue. Cover the area with a sterile gauze swab and seek medical attention immediately.

- Use and store liquid nitrogen in well-ventilated areas - if working in the 4°C or -20°C room, leave the door open and have a colleague stand in attendance at the entrance.
- Use materials resistant to embrittlement (e.g. latex rubber tubing).

Electrical Safety

- Never place paper or plastic products or preserved material in the ovens! Make sure that the "safety cut-off" is set to just above the required setting.
- Never remove the ground pin of a three-pronged plug.
- All wiring should be done by, or under the approval of, a licensed electrician of NMMU.
- Any electrical equipment that has been wetted should be disconnected at the main switch or breaker before being handled. **Any piece of electrical equipment removed from the 4°C room must be left at room temperature for at least 24 hrs to allow all moisture to evaporate before plugging it into a circuit.**
- Ensure that all wires are dry before plugging into circuits.
- Electrical equipment with frayed wires should be repaired before being put into operation.
- Minimize the use of extension cords and avoid placing them across areas of pedestrian traffic.
- Use only CO₂, halon, or dry chemical fire extinguishers for electrical fires.

Field work

When going on a sampling trip you must, along with your supervisor, discuss safety issues for the travel there and back, as well as while out in the field sampling. All hazards need to be identified as best possible, and safety procedures put in place **before** leaving the department, on any sampling trip. **No student should attempt a sampling trip on their own!**

- There is a Field Trip form that **MUST** be completed before leaving. This form must be lodged with the secretary. All information requested in the form must be provided.
- If you are using any of the Botany Department vehicles, a second Long Trip Vehicle Usage form that **MUST** be completed before leaving. This form must be lodged with the senior technician. All information requested in the form must be provided.

SAFETY CHECKS

Safety Checks are completed formally once a month by the Health and Safety Representative. This report is signed by the Head of Department

and submitted to the University's Safety, Health and Environment Manager. This does not mean that safety is a once-a-month occurrence. All students and staff are encouraged to make safety a part of their everyday life, at work as well as at home.

Basic checks include:

- first aid kit contents
- eyewashes and showers
- fume hood and other ventilation devices
- chemical storage compartments
- fire extinguishers
- access to fire escapes
- radiation levels in isotope laboratory
- waste bottle check

If you have any queries regarding safety please contact your health and safety representative (Chan Visagie) or Safety, Health and Environment Manager at NMMU (Johann Gerber, 5049941).

References

1. Wood, W. (1998) Environmental Safety Office, McGill University, Montreal. <http://blizzard.cc.mcgill.ca/eso/>
2. Perbal, B. (1988) A Practical Guide to Molecular Cloning; Ch 2: A few words about safety. 2nd Ed. John Wiley & Sons, USA.
3. Turnstall, J. (1998) Safety Procedures in Laboratories. University of Cape Town, Cape Town.
4. Moorhouse, S. (1998) Occupational Health & Safety Representative & Accident/Incident Investigation Training Course, Intra-Trance, Cape Town.
5. Sambrook, J., Fritsch, E.F. & Maniatis, T. (1989) Molecular Cloning: A Laboratory Manual," 2nd Ed. Cold Spring Harbor, Laboratory Press, Col Spring Harbor, NY.

6. Admission requirements

Honours: A BSc with a minimum of 60% for Botany as major is usually required. Applications are subject to a selection process as space may be limited.

Masters: A BSc (Hons.) is usually required for acceptance into the Masters programme.

Doctoral: An MSc is usually required for acceptance into the Doctoral programme.

The Nelson Mandela Metropolitan University recognises other forms of prior learning. Students who have not met the University degree requirements, but have suitable work experience should not hesitate to approach the Head of Department in connection with admission.

7. Departmental Equipment

All departmental equipment was motivated for and obtained through a lengthy process of negotiation based on supplementary funding and proof of use and maintenance. The University is increasingly expecting departments to pay for such equipment internally. This means that replacement of equipment is becoming increasingly difficult. Please take care of all departmental equipment and report maintenance required as soon as you notice a problem. The insurance policy of the University excludes insurance payments where no forced entry occurred. All items of equipment are to be locked away for safekeeping at all times.

The department has resources and equipment that are for use in research and teaching. Please report all faulty equipment or equipment in need of maintenance (e.g. toner low) to the Head of Department as soon as possible.

Equipment and requests for Technical assistance may be booked on the Departmental Intranet SharePoint. To book equipment and vehicles please use the following procedure:

1. Check availability on the SharePoint
2. Add a **"New item"**.
3. **Complete the page!** Title = item (only one) to be booked followed by your name (e.g. Isuzu 4x4 – Eileen) **List the equipment individually, or the items do not appear listed in the diary, and the reader cannot see what has been booked. Include your name here also!** User = your name (again); Date and Time = check the format for the date! And book for a few hours (/a day) before you want to use the equipment to avoid disappointment. Be sure that you can return the equipment at the time you say you will do so.
4. Click on **"Save and close"**.
5. A day or two **before** you wish to use the equipment **check that it is in working order**. A booking only gives one first option to a piece of equipment. It **does not** ensure current availability, or that it is operational. The onus is on the user to check.
6. Calibrate the equipment if necessary. It is departmental policy for researchers to calibrate ALL equipment they use (unless it is calibrated by the suppliers). The accuracy of your results cannot be blamed on the technicians.
7. Purchase appropriate batteries for the equipment. Please only use Duracell batteries as they are less likely to leak acid than the others.
8. **Sign out** the equipment on the day you wish to have it.
9. Before returning the equipment, clean it thoroughly. If you are uncertain as to how to do so, consult with a technician.
10. Please keep equipment dry and clean during the trip. Exceptions are obviously underwater equipment – this should be rinsed with tap water every day after use.
11. Return the equipment on the day you said you would return it. **Sign the equipment back in again.**
12. Report any problems you had with the equipment or faults that occurred. This must be submitted on the SharePoint site under Tasks. All tasks must be assigned to the Head of Department (Eileen Campbell) who will assign them to the appropriate technician. Please set a reasonable due date based on your further needs.

Major resource facilities include the following:

7.1 Laboratories

Laboratory space is assigned to postgraduate students or reserved for undergraduate practicals. Should you wish to use postgrad or practical lab space other than that assigned to you, please approach the Head of Department in this regard. All laboratories are shared resources: please keep your own and communal areas clean and tidy. No items may be left on the floor in the laboratories.

All items left on open shelves must be labelled with your name, date and content. Any solutions/samples/glassware/equipment left lying around the lab without a contents label, date, and students name, will be removed without prior notice.

You may give Alice glassware to wash, but be specific in your instruction to her. Dedicated glassware for e.g. nutrient analyses should be washed by the researcher.

7.2 Glasshouse

The glasshouse is used for germination, growing and experimentation with plants where the only controlled feature is water regime. Irrigation is controlled on the benches in the western wing and on the germination bench in the eastern wing. Other benches in the eastern wing are hand watered. Students wishing to use space in the glasshouse should register their project with Mr Smith and clearly label their experimental area and contents.

7.3 Cold rooms

Cold rooms are used for **temporary** storage of samples and long-term storage of chemicals that require cold storage. All items must be clearly labelled with the owners name, date and content.

When storing samples in the cold room - the floor is to remain clear, and there must be unhindered access to the shelves, at all times! This is a Health and Safety regulation and **IS NOT NEGOTIABLE!**

7.4 Trolleys

Trolleys are for the use of everyone (with the exception of the herbarium trolley – black one). They are not for storage. Use the trolley, and then clear it for use as soon as possible.

7.5 Growth cabinets

Growth cabinets may be booked and used after consultation with Mr Andrew Gouws. The name of the experimenter and the duration and nature of the experiment should be clearly displayed on the outside of the door.

7.6 Computers

The Department provides postgraduate students with computer facilities within the Department. Priority for use of these computers is for practicals as required by teaching staff, followed by the Honours students, and then other postgrads. Undergraduate students may use the computers if available. Postgrads must please ask undergrads to finish up their work and vacate the computer room if a computer is needed.

Printers available for postgraduate students are a high-speed LaserJet and a high-resolution A3 colour printer in the GIS lab. An A4 colour printer is available in the herbarium. Log sheets are to be filled in for **ALL** these computers so that your research grant can be debited with the cost of your printing.

7.7 GIS lab

The GIS lab contains several computers, printers and a plotter. These computers have priority of use for GIS. One of these computers has a DVD writer. You may use these computers for other uses provided they are not needed for their priority tasks.

7.8 Image analyser

The Image Analysis system is available for use on a booking basis. You may book for TWO hours a day; where possible after 12h00 (this time is flexible and can be negotiated with the Head of Department).

7.9 Maps

The map room contains a collection of topocadastral maps, orthophotos and aerial photographs. Some of these maps are Departmental, while others are Institutional or Private. Maps may be signed out for use from Prof Campbell.

7.10 Vehicles

The Department has two vehicles for its priority use: a VW combi (8-seater) and a twin-cab Isuzu 4x4. Vehicle use is limited to staff (or their designated drivers) and postgraduate students. Vehicles may be booked in advance on the Botany Sharepoint. Please acquaint yourself with the security procedures and rules for vehicle use prior to use.

Once having made a booking please cancel it as soon as you realise you will no longer be using the vehicle. It is frustrating to your colleagues if they need a vehicle, find all are booked, only to find out later that the booked vehicles never left the garages.

Additional documentation must be completed prior to overnight or long-distance trips. The vehicle may be close to a service, a long road trip could add too much mileage, which could result in certain guarantees lapsing.

Complete the vehicle log sheet **IN FULL**. This includes an expenditure code. If you do not know which expenditure code to use, you should check with your supervisor prior to commencing your research.

The vehicles are housed in a garage yard behind building 12. The yard is fitted with an alarm and the garages are fitted with another alarm. Both must be de-activated before entry and **MUST** be re-activated on exit. The combi gear-lock must also be fitted whenever the vehicle is not in use. If you accidentally set off an alarm, contact security to cancel the alarm. Failure to do so will make you liable for the security company's false-alarm call-out fee.

If you have used the vehicles in salt water, estuarine muds and beach sands, please hose it down on return. Please also fill the fuel tank on return (unless the tank is over $\frac{3}{4}$ full).

7.11 Technical Assistance

Technicians will assist staff and students where needed on submission of a logged request. These requests must be submitted via the Botany Area51 site (<http://area51.nmmu.ac.za/botany/lists/tasks>). Technicians have been instructed to only undertake tasks that have been logged in this manner. No verbal requests will be entertained.

8. Copyright

It is a serious offence to pass another people's work off as your own. At no stage is copied material (including from the Internet) acceptable as a submission for any assignment, practical, project or thesis. Students who copy the work of others run the risk of disciplinary action. Please read through the following set of frequently asked questions and answers. During 2010 all major work submitted must be accompanied by a declaration of ownership.

What is protected under the Copyright Act?

Literary (whether in written, printed or digital form), musical and artistic works, cinematograph films, sound recordings, broadcasts, programme-carrying signals, computer programs and published editions.

May I freely use material from a book that is out of print?

Out of print does not mean out of copyright. Copyright of the content lasts for 50 years after the death of the author. Copyright of a published edition lasts for 50 years from the date of publication.

How much text may I quote verbatim, fully acknowledging the source, without applying for copyright permission?

There is no set rule. You should not quote more than you need to quote to make your point, and you must always acknowledge the source and the author. A rule of thumb, which has no statutory force, is that if you intend to quote more than a total of 300-400 words from anyone source you have to apply for copyright permission.

May I use a figure, diagram or photograph from an existing publication without applying for copyright permission?

There is no copyright of ideas or of information, but there is copyright in the way they are expressed. Therefore, you have two options. You can either apply for copyright permission, or you can change the figure or diagram, imbuing it with some creative effort of your own, and then acknowledge the derivation. It is legally acceptable to present the same information in an original, value-added manner, as long as it substantially differs from the genuine artistic work. A photograph cannot be so altered, and permission is always required.

Can I use material (text or graphics) from journals, magazines and newspapers without applying for copyright?

There is no copyright of news of the day that is simply an item of press information. You must apply for permission, however, if you use any other material (text or graphics) from a journal, magazine or newspaper.

This particularly applies to cases where an article has been researched, analyses a situation or expresses an opinion. In other words, you would not need to apply for permission if you quoted from an article about a local building that has burnt down. However, you would need to apply for permission if you quoted from an article that analysed the psychology behind arson attacks.

May I use a cartoon from an existing publication and replace the words in the bubbles without applying for copyright permission?

No.

May I use material from another source in supplementary material (transparencies, slide shows, question banks, and so on) developed to accompany a book, without applying for copyright permission?

No.

To whom should you apply for copyright permission?

According to standard author contracts worldwide, the author is responsible for copyright. Application should be made to the author for permission to use his/her work.

Who is responsible for paying copyright permission fees?

In accordance with standard author contracts worldwide, the author who has used copyrighted material is responsible for paying copyright permission fees. Van Schaik Publishers can pay the fees as an advance against royalties.

To whom must I apply for copyright permission?

In most instances, the publisher of the material is the holder of copyright. In instances where the publisher does not hold copyright, the publisher will refer you to the copyright holder.

Where can I get help with tracing publishers' addresses and contact details?

The Internet is a valuable resource. The Publishers' Association of South Africa (PASA) lists contact details for most South African publishers on its website www.publishsa.co.za. Furthermore, many international publishers are listed by country at www.lights.com/publisher.

Acknowledgement

These questions and answers are based on a document developed by Monica Seeber of DALRO, and they have been adapted with her assistance.

Reference

Copyright Act, No 98 of 1978 as amended. (Copies obtainable from The Government Printer, Private Bag X84, Pretoria, 0001.)

9. Guidelines on research and scientific writing

9.1 Written presentations

An important part of the work of a scientist is to write reports on experimental or other studies undertaken. The report should be started while the work is in progress, so that the process can be accurately recorded.

Scientific recording

Record everything pertaining to the work in a single notebook.

Top each days work with the date.

Record the results in legible, understandable format. It is easy to forget what happened.

Enter units of each measurement.

Do not discard "unusual" results. Unexpected or erratic results do not always show that the experiment "didn't work" or that the researcher made an "experimental error". Rather take extra notes about the circumstances surrounding "unusual" results.

Enter the records onto a computer, checking each against the notebook. Remember that each transcription can result in errors.

Do not dismantle equipment until the first draft of the report is written. You may need to include some extra information.

Format of reports

Learn to write in a style compatible with your professional field: e.g. geographers report in a different style to botanists.

The preamble to the report itself should contain:

Title

The title should be concise, specific and reflect clearly what the report is about. It should be followed by keywords that are not in the title but that may be used in information-retrieval systems.

Name of author/s

If submitted for publication, the author's address should also be supplied. If not, provide the date (the publisher will date the published report).

Purpose of the report

Include the purpose of the report, e.g. Submitted as partial fulfilment of the requirements for Botany 3 at the University of Port Elizabeth.

Include the name of the supervisor.

The body of the report should contain:

Abstract

This should be a concise statement of:

what was done

the main features of the results

the conclusion or inference drawn

Statements of what is included or discussed should be **present tense**.

Statements of what you did or thought should be **past tense**.

For example: This report describes the interaction between ... and discusses the options...

But: It was found that ... and the results supported the recommendation that...

Introduction

This outlines the historical and theoretical background obtained from the literature and will enable the reader to relate the contents of the report to what is already known or has been done previously. This part of the introduction should be **present tense**, but historical statements are made in the **past tense**, and speculation should be **future tense**. An example: A specialisation found only within some Australian genera is the presence of a cyathium. This inflorescence has also been referred to as a harem (Dobson, 1976).

The introduction should end with the aim of the study: The purpose of this study was to determine whether...

Methods and materials

This section should contain a clear and exact statement of the material, apparatus and procedures that were used (past tense). Do not provide the instructions for the method (imperative mood) but convert them

into a statement (indicative mood) as a report on the methods that were used (e.g. you fill the jar and then cap it ... versus the filled jar was capped...). If a published method is used, you only need to provide the reference to it. If it was modified, you must provide the details of the modification and the reference to the original method.

Results

Only one form should be used for each set of data: graph or table or equation. Raw data should never be presented but may be included in an Appendix. Summarise the data into as few graphs as possible.

Lead the reader through the results, **describing** the graphs or tables in words, including statistical certainties or uncertainties. Do not interpret; this belongs in the next section. Each figure, plate or table **must** be referred to in the text; e.g. "The site was on a steep slope (Plate 1.)". Do not begin the results with a figure, table or plate. Numbers less than nine are written in words unless followed by units: e.g. "There were five quadrats..." but "The quadrats were 3 m²..."

Begin the results with the text placing the figure, table or plate being referred to on the nearest available page following its referral.

Discussion

This section should assess the results, the theoretical background and other people's opinion in the light of the purpose of the exercise.

Compare your results with published information. Interpret the results in the light of the aim given in the introduction. Errors, omissions and "unexpected" results should be fully explained.

Write only what is absolutely necessary and follow a logical sequence.

Do not just rephrase the results and avoid repetition.

Conclusion (not essential)

The discussion may end with a statement of conclusion. If the conclusion summarises the inferences of the results in the light of the aim, it may be placed under a separate heading.

Acknowledgements

This is a paragraph thanking those who contributed.

References

Failure to distinguish borrowed material from a student's own contribution is called plagiarism. It is a serious offence that may result in the stripping of the student's degree. This should not be confused with

referring to the work of others, which is essential, but must be correctly referenced.

Make sure that:

all references used in the text appear in the reference list.

all references in the list were referred to in the text.

Appendix

Raw data, detailed statistics, large tables and more specialised data may be placed in appendices.

Writing style

Write clearly and concisely. Long sentences become unclear. Guard against vagueness or ambiguity. There is nothing as irritating as verbosity

Take care with grammar, syntax and spelling. Read the report through carefully before submission.

Graphs and diagrams have visual impact and make understanding trends easier. Do not confuse them by cluttering them with too much data. Do not include too much detail. Put minor details in the Appendix.

The discussion and conclusions should match the aims. Make sure that you can convince the reader that the conclusions are significant.

The report must be neat and legible.

Make sure you understand the meaning of each and every word! If not you will be caught out!

Use verbs instead of abstract nouns:

Not: The separation of A from B was effected by...

Rather: A was separated from B by ...

Not: Isolation of the tertiary compound was accomplished by...

Rather: The tertiary compound was isolated by...

Break up clusters of modifiers:

"gamma radiation scintillation detector crystal"

"silica gel coated glass fibre optics spectrophotometry"

Follow conventions when using scientific names:

In Botany the rules of nomenclature are well defined: follow them!

Avoid "etc." like the plague! It indicates that you don't know.

Avoid using "thus" and "therefore". They are seldom used correctly.

Watch the use of the following confusing words:

which & that
since & because
while & although
between & among

Statistics

State the hypothesis tested.

State the statistic, degrees of freedom (d.f.) and probability: $t = 2.456$,
d.f. = 21, $p < 0.05$.

Give the same number of decimals that you recorded: if you measured length accurately to cm do not report mm accuracy. A record of 3 cm indicates that accuracy was to the nearest cm while 3.0 cm indicates accuracy to the nearest mm. State the limitations of the method.

Use simple notation that is easily understood: 47 rather than 4.7×10^1 ;
but 0.3×10^9 rather than 300 000 000. Try to standardise.

Try to use the standard powers rather than intermediate ones. This means that you can use the standard prefixes: kilo- mega- giga- ... but be practical: it is better to report 3 g than 0.003 kg. A zero must always precede the decimal: 0.3 never .3.

Always report the units! In complex units only one solidus (/) may be used per set. If there are more use ⁻¹: e.g. irradiance in $\mu\text{mol m}^{-2} \text{s}^{-1}$. Note the absence of the ".". That would read "μmoles times by per metre times by per second". This is how it is calculated but it reads poorly.

Tables

Make sure that all tables are referred to in the text.

It is wasteful to tabulate a few figures or values.

The table is **headed** by a descriptive title that should explain what the table contains without the need to refer to the text except for minor details.

Aim at visual impact of trends.

Align all figures and symbols. Keep all decimal points under each other. Put the units in the heading or line labels. Column headings should be centred over the data.

Additional comment can be provided with an * or superscript symbol.
Place the table as soon after the first reference to it as is practically possible.

Do not represent data as both table and graph.

Figures

All illustrations (graphs, maps and line drawings) are figures.

Photographs are usually referred to as plates and are numbered independently.

Locate figures as soon after the first reference to it as is practically possible.

Each figure must have a descriptive caption complete enough to eliminate the need to refer to the text. The caption is given **below** the figure.

Photographs that indicate the size of something must have a suitable scale bar or object.

Don't forget the key (legend) on graphs, diagrams or maps. All maps must have a scale and north arrow.

Related data should be on the same graph.

Interpolation (joining the dots with a line) is only legitimate when the variables are continuous. Never plot continuous and discrete variables in the same graph.

The x-axis must be independent and the y-axis dependent (depth is an exception for visual impact).

Don't draw arrowheads on the ends of axes.

Don't draw guidelines when plotting points.

Further suggestions are given in four extracts from SABONET NEWS entitled: "How to write articles for publication" in the herbarium.

9.2 Oral presentations

Time allocation

Speakers are allowed between 10 and 20 minutes for their presentation.

After that, there are usually 5 minutes of questions. Marks will be deducted for presentations that are too long or too short. Practice until the talk takes up the allotted time.

Session chairpersons are expected to be extremely strict with time allocation. The session chairperson usually stands up when there is 1 minute left. They generally do not allow any questions after the allocated time is up.

Preparation

What do you want to achieve?
Who will be there?
How interested will they be?
What is the size of the venue?

Planning

What is my conclusion going to be?
What are the main points I want to make?
Does the conclusion depend on each point? If not discard it.

Structure

Introduction

Write out and memorise your opening sentence (for confidence and impact).
Follow up with a concise statement of the central message.
List the main points you will be covering.

Notes

Use cards or sheets if a podium is available. Number them!!! Write in large letters so that you can see them easily.

Appearance

Wear simple clothes in a strong colour. Dress as formally as the most formal of your audience. The first impression of your talk is what you look like.

Voice

Breathe deeply to get good voice resonance.
Project your voice to the back of the room - speak to the back row.
Speak at half the pace of normal conversation.
Vary your tone - don't be monotonous.

Body language

Smile or try to look friendly. Believe that the audience is interested (make sure you are!).

Look directly at as many people as possible, not just straight ahead.

Refer to your notes as little as possible.

Never look at the floor, the back wall or the ceiling.

Prepare in front of a mirror or video camera, or ask your friends to point out your mannerisms such as fidgeting with a pencil, rising up on your toes, clasping your hands, pacing.

Visual aids

People remember 11% of what they hear

 40% of what they see

 65% of what they see and hear

You may choose from flip charts, posters, black boards, projector slides, overhead transparencies, videos, films, and computer visuals.

Allow enough time for the audience to absorb the material. Allow about 2 minutes per slide.

The rule is: ONE IDEA - ONE SLIDE

Use a maximum of 6 lines per slide.

Check the legibility of each slide before the time.

You will be assessed on how you answer and well as ask questions. If you don't know the answer, do not stand and "umm." Acknowledge that you do not know the answer and possibly speculate on what the answer might be. After all, you are talking about work you did. You should be familiar with the subject.

Adapted from Anon., 1993. Manual on scientific writing. TAFE publications, Collingwood. 103 pp.

9.3 Powerpoint presentations

Do not host the entire script of your presentation in your PowerPoint slides. Use your slides to highlight the essence of your presentation.

Do not use the default screen background in your PowerPoint slides. If you do, you may end up with a presentation that looks just like everyone else's. Try to show your audience that you have some imagination when building a set of PowerPoint slides.

Carefully choose the colours you use. Some colour combinations are hard to read. Colours have different wavelengths and your eyes must adjust. If you mix long and short wavelength colours on the same slide, at best your slide will be unreadable; at worst you will give your audience a terrific headache! Use a dark blue background with red writing to see an example of poor colour combination.

Use fonts (type faces) that are large enough to see from the back of the room. The major reason for using small fonts in presentations is to fit a great deal of information onto the one slide. Rather than making the font smaller, look at putting less information onto each slide. Then if you end up with too many slides, you are probably trying to put the script of your presentation in your slides!

Make sure that the font you choose is easily readable. **SOME FONTS ARE VERY DIFFICULT TO READ.**

Allow plenty of "white space" (or whatever colour you are using as a background). This should happen automatically if you follow all of the rules above.

Give all of your slides a consistent look throughout the presentation. Under no circumstances should you change the colour scheme within a presentation, it will really annoy your audience. This means that if you're importing slides from another presentation, you will have to change the imported slide's colour scheme to match that of the new presentation.

Do not use too many special effects to cover up lack of content in a presentation. PowerPoint has a huge toolbox of effects to brighten up your presentation and they can be effective if properly used but in most cases should be avoided.

If you really need to make an impact with your presentation but feel that you do not have the expertise to do it justice, seriously consider taking your outline and text to a graphic artist and have them build the presentation for you.

Do not use PowerPoint as your word processor. PowerPoint has some word processing capabilities, but that is not its main function. If you are processing words, then use a good word processor like Microsoft Word.

Run the spell checker (even if it does not recognise generic names)! You can add words that are not in MSWord's dictionary but make sure that they ARE spelt correctly before doing so.

10. ICT Usage

NMMU ICT resources are to be used for *bona fide* academic and administrative work, with the understanding that limited personal use is acceptable (e.g. personal correspondence) so long as this use does not:

- directly or indirectly interfere with the University's computing resources.
- disrupt services to other users or deprive them of resources.
- result in any additional costs to the University.
- interfere with the user's employment obligations to the University.

Every User is responsible for taking reasonable steps to protect the ICT resources of the NMMU

All users must apply the university copyright policy and Copyright Acts of the government. It should be specifically noted that Software Piracy is a criminal offence.

The use of NMMU ICT systems must be consistent with all contractual obligations of the University, including limitations defined in software and other licensing agreements.

NMMU ICT resources may not be used for private income-generating or profit making or non-NMMU commercial activities unless specifically authorised by the University.

NMMU ICT resources may not be used in any way that may embarrass or bring discredit to the University.

NMMU ICT resources may not be used for any unlawful activity, such as the creation or transmission of material which is offensive, obscene, defamatory, damaging or fraudulent.

The use of NMMU ICT resources for gaming is prohibited.

No person shall by deliberate, reckless, or unlawful act cause disruption to services, degrade the performance of an information system, or jeopardise the integrity of data networks, computing equipment, systems programs, or other stored information.

Every user has the responsibility to keep their passwords confidential.

No person may access, or attempt to access, or tamper in any way with another user's data without proper authorisation.

Users are further subject to any specific rules or end user agreements entered into with faculties or departments in which they operate.

Users indemnify NMMU against any loss or damage that may result from improper use of the university's ICT infrastructure.

Abuse of NMMU electronic systems and facilities may lead to a withdrawal of electronic communication privileges or disciplinary steps against offenders.

The receiving, storing, downloading, possessing, distributing, accessing or creating of illegal content (as defined above), by any user, will be subject to an investigation and disciplinary action.

All users at NMMU are bound by applicable laws in South Africa and the NMMU will fully co-operate with authorities to provide required information if any User is suspected of illegal activities or cybercrime.

The University may take reasonable steps to enforce its ICT policies through administrative and technical controls including filters, monitoring mechanisms and automated tools.

10.1 Responsibilities

It is the responsibility of every user to become familiar with the policies, procedures and guidelines of the NMMU.

The institution's ICT Services department is responsible for:

- Cross functional ICT services and resources.
- Sustaining users' awareness of this and other Institutional policies related to the use of the Institution's electronic facilities.
- Provide users with guidelines for the proper use of the Institution's electronic facilities.

The institution's management is responsible for taking any necessary action against users who fail and/or refuse to abide by this policy.

The Head of Department reserves the right to amend or supplement any or all of the above rules, regulations and information at her discretion. Such changes will be communicated to you. Please feel free to contact the Head of Department should you experience any difficulties or problems.



Prof Eileen E Campbell
HEAD OF DEPARTMENT
BOTANY



ACKNOWLEDGEMENT

I, _____ (name),
_____ (student number),

hereby acknowledge that I have read and fully understand the general laboratory rules as laid out before me. I realise that by reading and signing this document I am making my laboratory a safer place to work for me and my fellow students. My failure to comply with these rules constitutes negligence on my side and endangers my life and that of my fellow students.

Signature

Date
