



Central University of
Technology, Free State

MANUAL FOR

Research Development and Postgraduate Studies Support



Sharpen your pencil...

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January 2021

Manual drafted by the Section for Research Development and Postgraduate Studies

Disclaimer

The provisions of this manual are not to be regarded as an irrevocable contract or source of information between students and the Central University of Technology, Free State (CUT). Please refer to the CUT Calendar/Yearbook, the CUT Student Assessment Manual and the CUT Intranet for a full account of regulations, policies, procedures and prerogatives of the CUT.

All enquiries can be directed to the Research Development and Postgraduate Studies Section: (051-507-3279 / 3336)



Central University of
Technology, Free State

Manual for Research Development and Postgraduate Studies Support

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A collection of blue and wooden pencils scattered on a light blue surface. The word "INTRODUCTION" is overlaid in white text in the center.

INTRODUCTION

The *White Paper for Post-school Education and Training* and the *National Development Plan* align various initiatives to promote human capital development (HCD) in research, innovation and scholarship in South Africa. These documents provide a good overview of the challenges facing HCD in research, innovation and scholarship. The statement that HCD requires a multi-faced approach can be supported.

Institutions can identify the challenges related to HCD and should be able to present their actions in support of the identified challenges. The Central University of Technology, Free State (CUT) fully supports the strategy to improve on its postgraduate student throughput and research publications. However, it is evident that there is a need to reconcile three challenges: the development of researchers and postgraduate students, partnerships and collaboration (especially with Science Councils and international partnerships and collaboration), and greater responsiveness to technological innovations and social economic development.

Although implied by the HCD strategy, is it fundamental that universities should reconsider what it is that they are doing research on and what outputs emerge from that research. There is a big difference between being research active (producing publications, graduations), and undertaking purpose-driven research activities (meaning activities where researchers are (i) engaging and reflecting on their disciplines; (ii) extending the scientific basis of their disciplines; and (iii) addressing policy and socio-economic needs which may not always be the direct aim of a research project).

The purpose of this manual is to assist and guide researchers and postgraduate students by means of good practices associated with the research process at the CUT. This manual should provide support to researchers and postgraduate students in doing their research. This manual does not pretend to provide all the answers, but rather attempts to direct researchers to where the supportive material can be found, and to show them how this material can assist researchers to accomplish their research.

Prof. Laetus OK Lategan

Senior Director: Research Development and Postgraduate Studies

CHAPTER 1

Research and development at the
Central University of Technology, Free State

Research and development at the Central University of Technology, Free State

As a university of technology, all research programmes are directed at solving problems in business, industry, government and society (this is known as the quadruple-helix approach, and are aimed at contributing to the socio-economic development of the region. The research aims, objectives and values of the CUT are reflected in its Vision 2020 statement, the Academic Plan 2014-2020, the Research and Development Plan 2014- 2020, and the Technology & Innovation Plan 2014-2020.

Mindful of its mission as a public technological higher education institution with international perspectives, the CUT has a public commitment to provide a place within the institution for all eligible applicants. The CUT is furthermore committed to establishing a student body that not only meets the CUT's high academic standards, but also encompasses the cultural, racial, geographic, economic, and social diversity of South Africa.

Where RESEARCH is normally understood to have a research question/problem for which a solution must be sought, INNOVATION can be explained as having the solution to the problem which must now be converted into a possible product/prototype that can be commercialised normally.

The focus of research programmes is multi-, inter- and trans-disciplinary of nature, with an emphasis on sustainable development, answering especially questions such as what kind of research is done? what are the objectives? and what impact will the research have?

At the CUT, research, postgraduate studies, research development, technology transfer, innovation and commercialisation activities are understood to be complementary. These activities form part of what is commonly known as the research cycle.

The research cycle can be described as the process of taking the research problem through various academic stages (such as enrolment for postgraduate qualifications, publication writing, presentation of conference papers and supervision) to the process of innovation and patenting (intellectual property), commercialisation (spin-in to business and industry, and the first step towards third-stream income) and eventually production (spin-out and sustained third-stream income).

Where research is normally understood to have a research question or problem for which a solution must be sought, innovation can be explained as having the solution to the problem which must now be converted into a possible product or prototype that can be commercialised.

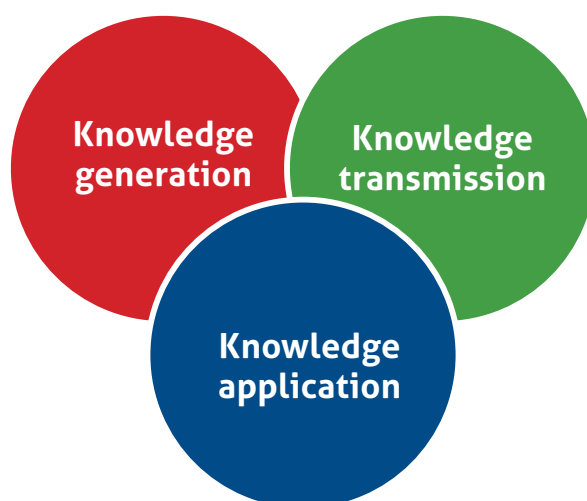
The research cycle thus reflects the integration of research, postgraduate studies, research development, technology transfer, innovation, and commercialisation.

In acknowledging the research cycle and the execution of the research assignment as one of the core activities of the university, the following categories of research participation and productivity have been identified at the CUT:

- Study towards highest qualification in field of study
- Participation in research training
- Writing of publications, e.g. books, articles, conference proceedings, etc.
- Conference presentations
- Postgraduate supervision
- Applying for research grants
- Professional research engagement (editorial board, review panels, assessment panels)
- Transfer and innovation (spin-outs)

The CUT regards the development of research, technology transfer and innovation as a continuum. All research activities are regarded as part of the research cycle. Ideally, research participation and productivity should increase as staff members improve their research training and experience; junior lecturers should engage with the improvement of qualifications and participation in research training; and the professoriate should engage with all activities associated with research participation and productivity.

The CUT recognises the important role of industry, business, government, and social communities in doing research. The university's research objectives are viewed through three core activities: knowledge generation (research), knowledge transmission (teaching) and knowledge application (engagement through technology transfer, innovation, and incubation). What we research should have an impact on how we teach and engage with the community. Questions in teaching and learning should open new opportunities to do research on challenges in business, industry, government, the economy and social communities, and should stimulate the research agenda. The three activities are interrelated:



Essentially, research has five core characteristics: problem investigation, critical enquiry, alignment of knowledge patterns, analysis of facts and data, and the discovery of new knowledge. *Research* can therefore be defined as a process of critical analysis to solve scientific and applied (industry-, business- and government-related) problems. This approach embodies the search for new knowledge through scholarly work supported by partnerships and networks.

- Study towards highest qualification in field of study
- Participation in research training
- Writing of publications, e.g. books, articles, conference proceedings, etc.
- Conference presentations
- Postgraduate supervision

Although the concepts are not synonymous, research cannot be without *scholarship*. *Scholarship* is the body of principles and practices used by and processes followed by scholars to make their claims about the world as valid and trustworthy as possible, and to make these results known to scholarly and public communities. It furthermore entails the methods that systemically advance the teaching, research, and practice of a given field of study.



CHAPTER 2

Research structures and services in
support of Postgraduate Studies

Research structures and services in support of postgraduate studies

2.1 There are sufficient research structures and services available to support the postgraduate research projects of both students and staff

Research support in faculties:

2.1.1 Assistant Deans: Research, Innovation and Engagement

Assistant Deans: Research, Innovation and Engagement (ADs: RIE) manage, administer and oversee research development and postgraduate activity within the faculty. The ADs: RIE's key roles can be summarised as:

- a) creating a vibrant research environment and culture,
- b) providing managerial support, and
- c) administering research activities within the faculties.

The ADs: RIE will represent the faculties' targets, plans, internal criteria and procedures.

You are invited to contact your ADs: RIE who will advise and direct you in dealing with your research enquiry.

2.1.2 Faculty Research and Innovation Committee (FRIC)

The AD: RIE is the chairperson of the Faculty Research Committee. Each FRIC's functions are custom-specific to the research plan of the faculty. In addition, the following services are provided by FRICs:

- a) Approval of the following applications (in alignment with policy, procedure and faculty targets):
 - National and international conference attendance
 - Sabbatical leave.
- b) Recommendation of student applications for scholarships and grants to the Scholarship and Grants Committee.
- c) Identification and approval of supervisors and coordination of academic supervision.
- d) Coordination of the following activities:
 - Faculty research workshops
 - Prestige research seminars or colloquiums where postgraduates can present work in progress.
 - Provision of support in the establishment of a Postgraduate Student Association.

2.2 Research and development

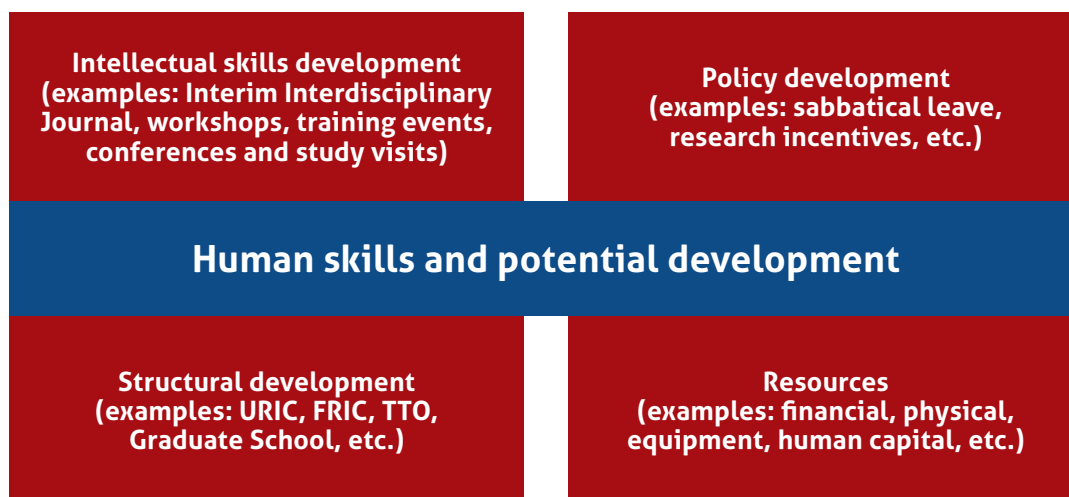
The Research Development and Postgraduate Studies Section assists and supports postgraduate researchers across all faculties to develop their research capacity and increase research outputs.

Core activities performed by the Research Development and Postgraduate Studies Section:

- a) The general administration of the development of research and postgraduate study projects.
- b) The management of pre- and post-grant awards, administration, monitoring and evaluation of internal and external postgraduate student and employee grants and scholarships.
- c) The development of research skills through workshops and mentorship programmes.
- d) The monitoring, evaluation and analysis of the performance of institutional research development and postgraduate studies.
- e) The promotion of research ethics and integrity in scholarly work.
- f) The coordination of research activities through Research Information & Management Systems (RIMS).

Table 1 illustrates the core capacity-building functions of this Section:

Table 1: Capacity development model



These capacity development activities can be explained as follows:

2.2.1 Structural development and support

- a) The Graduate School

The Research Development and Postgraduate Studies Section administers a virtual Graduate School. The purpose of this School is to provide collective support to supervisors and postgraduate students in growing their research capacity, and to provide access to *best practice* resources in support of research. A programme on research education and a number

of books, as well as electronic resources, have been developed to support academic staff, postgraduate students and postdocs in doing their research (see list of books published in section 2.2.2, below).

b) Identification of research profiles and implementation of strategic research programmes

The following research profiles and programmes have been identified to grow human skills and potential. These integrated programmes offer opportunities for growth and are directed at final-year undergraduates, postgraduate students and staff, and rated researchers:

Table 2: Research and Development Programmes

R&D programmes	Aims & outcomes	R&D support
Undergraduate to Graduate Students' Programme	Grow postgraduate enrolments. Successful completion of studies. Funding applications for postgraduate studies.	Research modules are updated in all curricula by HODs to bring students on par with the research culture of the university. Supplementary workshops on the research process and writing for funding applications. Funding through NRF B Tech block grants and NRF grant holder-linked funding.
Master's Education Programme	Successful completion of studies in residential period. Application for funding.	Workshops focusing on research design, methodology, literature review, scientific writing, and writing for funding application. Support to supervisors. Support to read one conference paper at faculties' Prestige Research Day and 'three minute presentation' opportunities.
Doctoral Education Programme	Successful completion of studies in residential period. Application for funding.	Workshops focus on research methodology, statistical analysis, science writing and funding application. Support to supervisors. Support to read one (1) conference paper at a national conference and one (1) colloquium presentation. Research Day and 'three minute presentation' opportunities.
Next Generation Researchers' Programme: Staff studying towards a doctorate	Successful completion of D degree. Application for funding.	Support and training of supervisors' research workshops. Waiving of tuition fees for staff.

R&D programmes	Aims & outcomes	R&D support
Emerging Researchers' Programme	Following on completion of a Doctorate and in preparing for a research career, this is for newly appointed staff who obtained a doctoral degree in the two years before joining the university. Focus is on development of research competencies: supervision basics, publications, presentations and applications for funding.	Mentorship. The development of research competencies.
Mid-career Researchers' Programme	Delivering outputs that would typically lead at a national level. Developing own research programme with participating members and students. Obtaining of research competencies and infrastructure in support of active research contribution. Grant applications.	Mentorship. Project support. Application for NRF rating.
Established Researchers' Programme	Recognition as a leader in his/her field of study. Becoming an international expert in research programme through national and international funding, collaboration and joint programmes.	Project support. Application for NRF rating.
Women in Research Programme	Enabling black female researchers to complete doctorates and to develop academic career.	Mentorship and career development. Research workshops. Project support.
Rated Researchers' Programme	Maintaining NRF rating. National and international recognition.	CUT funding for the duration of a rating period.
Postdoctoral Fellowships	Prepare for an academic career.	Two tracks as outlined below.

Note: The number of grants available is subject to the annual institutional budget.

c) Postdoctoral Fellowships

The Postdoctoral Fellowship is a structured programme to develop scholarship and research skills. The university offers two types of postdoctoral fellowship:

Track 1: Full time Postdoctoral Fellowship for a duration of 3 years subject to annual satisfactory performance.

Track 2: Postdoctoral students who have completed their doctoral studies with the CUT but who are not university staff members (and/or are employed elsewhere) could enter into a Postdoctoral Fellowship for 3 years on a part-time basis.

The contents of the Postdoctoral Fellowship Programmes are outlined in Table 3, below:

Table 3: Postdoctoral fellowship programmes at the CUT

	Track 1	Track 2
Name:	Postdoctoral Fellowship (full time)	Postdoctoral Fellowship (part- time)
Duration	3 years, full time	3 years, part-time
Purpose	Scholarship and research skills development	Scholarship and research skills development
Expected outcomes	<ul style="list-style-type: none"> ⓐ Publication writing based on research project. ⓐ Funding application for current research project. ⓐ Conference attendance for current research project. ⓐ Supervision. ⓐ Contribute to research development, planning and, in general, by attending research forums, workshops and presentations at the CUT. 	<ul style="list-style-type: none"> f Publication writing based on completed doctoral study. f Conference attendance based on completed doctoral study. f Contribute to research development, planning and, in general, by attending research forums, workshops and presentations at the university.
Expected outputs	Participate in the official research programme.	Writing-up and publication of research results based on completed doctorate.
Process of application	Call for scholarships. External panel to evaluate applications on a competitive basis.	Call for scholarships. External panel to evaluate applications on a competitive basis.
Status	Postdoctoral fellow	Affiliated with the CUT as part-time Postdoctoral fellow.

d) The University Research and Innovation Committee (URIC) The URIC fulfils the following functions:

- Position, coordinate, monitor and evaluate research, research development, technology and innovation according to the goals set in the *Institutional Operational Plan based on the Strategic Plan of the University; Research and Development Plan and Technology and Innovation Plan*.
- Develop appropriate research, research development, technology, and innovation.
- Position, coordinate, monitor and evaluate a research culture amongst all staff and students.
- Approve student grant applications and awards.

- Implement and promote research ethics and integrity codes and practices.
- Ratify the decisions of sub-committees where applicable and in line with URIC functions and delegations to committees. These may include, for example, proposals, ethical clearance, recommendations, supervisory and examination panels.

The URIC performs its functions through the following sub-committees:

- Faculty Research and Innovation Committees (FRICs) under Faculty Boards
- Research Grants and Scholarships Committee (RGSC)
- Intellectual Property Steering Committee (IPSC)
- Research Ethics and Integrity Committee (REIC)

Note: The constitutions and application forms for each of these committees are accessible to staff and registered students on the CUT Intranet (www.cut.ac.za).

2.2.2 Intellectual skills development

The Research Development and Postgraduate Studies Section provides opportunities for intellectual capacity building by enabling conference proceedings and study visits, presenting workshops and training events, as well as by publishing two journals (the *INTERIM* and the *JNGS*), providing opportunities either to publish articles or to gain experience as an editorial board member.

a) Books published in support of research development and postgraduate studies

A variety of books have been published to develop intellectual capacity. Some of these titles are:

L. LUES & L.O.K. LATEGAN. 2006. *Re:search ABC*. Stellenbosch: Sun Press.

L.O.K. LATEGAN (Editor). 2008. *An Introduction to Postgraduate Supervision*. Stellenbosch: African Sun Media.

L.O.K. LATEGAN & U.D. HOLZBAUER. 2009. *Managing Applied Research: Theories, Cases, and Perspectives*. Aachen: Shaker Verlag.

G.D. JORDAAN & L.O.K. LATEGAN. (Editors). 2010. *Modelling as Research Methodology*. Bloemfontein: Sun Press.

L.O.K. LATEGAN, L. LUES, & H. FRIEDRICH-NEL. (Editors). 2011. *Doing Research*. Bloemfontein: Sun Press.

U.D. HOLZBAUER, L.O.K. LATEGAN, K. DYASON & D. KOKT. 2012. *Seven Imperatives for Success in Research*. Bloemfontein: Sun Media.

L.O.K. LATEGAN (Editor). 2017. *Get ready ... Get set ... Go! Preparing for your doctoral studies and doctoral education*. Bloemfontein: Sun Media.

These books are also available at the CUT Library and Information Services on both the Bloemfontein and Welkom Campuses.

b) Support to faculties

The Research Development and Postgraduate Studies Section supports faculties in setting the platform for student and staff participation in research. Typical examples are:

- Faculty research seminars
- Departmental research colloquiums
- Guest lecturers on research ideas/projects
- Various student competitions
- External collaboration projects
- Student travel and exchange programmes

c) Workshops presented by Research Development and Postgraduate Studies

The following workshop themes are part of this Section's annual schedule. Please consult the website for meeting dates.

Table 4: Focused research workshops throughout the year by R&D

Programme	Contents
General institutional workshop	The research process and explanation of the support, scope and activities of R&D.
Research ethics and integrity workshop	A code of research ethics and integrity for the CUT.
Postgraduate supervision	A training programme to assist students to complete their studies.
Publication writing/ scientific writing workshop	A training programme in support of scientific writing skills.
Research funding applications	A training programme in support of applying for funding.
Research methodology	A training programme in support of research methodology training.

d) Research publications at the CUT

The Research Development and Postgraduate Studies Section publishes two research journals: *INTERIM* and the *JOURNAL FOR NEW GENERATION SCIENCES (JNGS)*. Examples of these publications are linked on the CUT website.

INTERIM: Interdisciplinary Journal

The INTERIM is a CUT, in-house interdisciplinary developmental academic journal that gives new researchers the opportunity to publish their research. More than twenty editions of the Interim were published between 2002 and 2018, constituting more than 250 papers. The INTERIM serves as a unique outlet to publish work in progress and aims at developing scientific writing skills in publishing research that meet an acceptable standard of research and writing. It also provides an opportunity for academic staff to develop editorial skills through serving on the editorial board.

The *INTERIM* especially affords *next generation* researchers the opportunity to familiarise themselves with the intricacies and challenges of publishing. The purpose is to build confidence in publication writing, to have supportive critique and to gain experience in meeting the requirements for publication.

The Research Development and Postgraduate Studies Section provides administrative assistance to support the publication process. With each call for articles, the editor will stipulate the desired format and means of submission, will provide the guidelines and announce a submission date. Articles are peer reviewed and feedback is provided to authors. Training workshops support the writing applications.

Steps to publication in the INTERIM



Guidelines for the publication of articles in the INTERIM

- e) Articles are published in English. The preferred length is between 4500-5500 words.
- f) All articles should be accompanied by a 100-word abstract.
- g) All articles should have three to five key words. These should be part of the abstract.
- h) The article should be properly edited, stylistically polished and carefully proofread.
- i) The editor reserves the right to make such alterations as he/she sees fit to accommodate the style and presentation of the article to meet the style of the *Interim*. Where major changes are necessary, the text may be returned to the author for correction or approval.
- j) Copyright is transferred to the Central University of Technology, Free State on acceptance for publication.
- k) Titles should be short and concise. Suitable headings and subheadings should be provided. No more than 2 levels of subheadings are desired, for example: 1.1 and 1.1.1
- l) Source references in the text should be in the *Harvard* style, using the author's surname and date.
- m) All *notes* should be regarded as *footnotes*.
- n) Abbreviations and acronyms must be written out in full the first time that they are used.
- o) Italics should not be over-used for emphasis. Latin phrases such as *per se* must be italicised. Words in languages other than that of the manuscript should be given in quotation marks.
- p) All articles will be peer reviewed.
- q) The author of a published article will receive one copy of the relevant issue of the journal. No honorarium will be paid.

Keep in mind that your article submitted to a journal (as attachment to your dissertation and thesis) assists to grow your research profile.

Common errors

Authors are directly involved in the review and publication process, which enables them to reflect on common errors made by other authors. These are examples of the common errors:

- a) Titles of papers: many titles are not representative of the contents of the paper and lack alignment of aims and objectives to the title of the paper.
- b) Design: not all papers are well planned with an appropriate methodology and sufficient evidence in support of the research question.
- c) Research question: many papers lack a proper research question or hypothesis.
- d) Methodology: very often the methodology is not supportive of the research, or authors don't know the difference between research method and research methodology.
- e) Literature review: too many authors simply repeat what is already stated in other papers instead of reflecting on and engaging with existing texts.

- f) Literature consulted: the latest texts are not always consulted.
- g) Conclusions: papers often have no new knowledge to add to an existing debate. Papers very often merely recycle what is already known in research.
- h) Referencing: authors do not always follow the appropriate referencing guidelines.
- i) Contents: there is often not a clear understanding that a paper has different parts and that each part has a specific purpose and must not be repeated.
- j) Footnotes: additional information in support of an argument and not new information.
- k) Language: papers do not always meet grammar, style and discourse requirements.
- l) Scientific writing: there is not enough argumentation and critical reflection in many papers.
- m) Ethical challenges: very often no evidence that basic ethical requirements are met, such as recognition of funding agency, feedback to sample group, etc.
- n) Relevance of paper: some papers are just adding to what is already known.
- o) Technical requirements: papers do not always meet the technical requirements of the Interim (for example, the length of the paper, the required referencing technique, the lay-out of the paper, etc.)

Guidelines to referees of papers for INTERIM:

Please provide comments in respect of the following questions:

- a) Does the title reflect the contents of the paper?
- b) Do you deem the paper to be proof of thorough research and knowledge of the most recent debates and literature in this field of study?
- c) Does the paper reflect a high standard of scientific reasoning?
- d) Does the paper contribute to the technological sciences as a specific field of study?
- e) Does this paper reflect application to business/industry/the world of work?
- f) What is the desirability of this paper being published in the *Interim*?
 - Without alterations.
 - With the following alterations:
 - Preferably not.
 - Other comment(s):

JOURNAL FOR NEW GENERATION SCIENCES

The *Journal for New Generation Sciences* (JNGS) is a DHET-accredited publication, published biannually by the CUT. Papers in the technological sciences are reviewed and published in its July and December editions. The JNGS is an accredited research publication where scholars, internal and external to the institution, may publish. It accommodates national and international publications and showcases the university's commitment to applied research.

All papers are peer-reviewed by at least two experts. An editorial review also secures the quality of the paper. The JNGS supports both high quality scholarly work of established researchers, and capacity building amongst new researchers. Full detail on the JNGS can be viewed at www.cut.ac.za/jngs

2.2.3 Policy development

a) Research ethics and integrity

The study of research ethics and the application of research integrity are not new to the scientific community. This is evident from the large number of ethical codes and best practices that exist around the world.

As research is more and more driven by the human rights culture based on the dictum '*do no harm*', economic prospects and business decisions, renewed attention is placed on research ethics to regulate the research process.

Following from literature and policy reviews, debates and applications, it is evident that the challenge is not limited to a conceptual understanding of ethics and integrity only. In a post-modern society the question is: *Whose ethical perspectives should prevail?*

Another challenge is the concern that, although an enabling ethical climate can be created, there is no guarantee that researchers will behave according to ethical expectations. Hence, the question remains as to whether one can teach or train researchers to be ethical. Will a researcher's personal value system secure sound ethical behaviour and/or integrity? The answer remains debatable. If one observes what is happening around the world in research laboratories and lecture rooms, it rather appears as if ethical/integrity problems are multiplying.

A third challenge is that researchers (especially in the natural sciences) often regard the ethical review as removed from the research process where in fact ethical principles should be recognised and applied during all the stages of the research process.

Although not normally mentioned, this community cannot be without a value-for-money approach (economic responsiveness), quality in research (versus mediocre research outputs) and useful research (in service of society). Research is therefore not an isolated activity. It links up with academic practices, the needs of business/industry/government and the application and implementation of research results. The following challenges and concerns should be noted:

Plagiarism: Plagiarism is taking another person's ideas and presenting them as your own. This is nothing less than taking someone else's intellectual property and behaving as if you were the rightful owner of this property. (The CUT *Student Assessment Manual* deals with the matter extensively. This Manual is accessible to staff and registered students on the CUT Intranet.)

Data-handling: The way in which data is treated, secured and protected is also a matter of concern. The purpose of data is to serve as evidence in building an argument and should therefore be reliable. If data is misused, what guarantee is there that the data itself can be trusted? Data misuse and abuse is dishonest and misleads the research community and the public as end-users of such information.

Safety of people and society: The results of scientific research are not meant to threaten or harm people or society, but should by their very nature encompass people, the environment, cultures and systems in a non-harmful way. If the proverbial 'Frankenstein's monster' is produced as a result of scientific endeavour, however, society will feel insecure and will then have the right to question the purpose of the research, its results and impact. It is important to remember that integrity starts with the individual. The researcher is his/her own keeper. This also relates to the importance of stewardship for own intellectual interventions.

There is general agreement that in the training of researchers not enough attention is paid to the ethics of supervising research teams and postgraduate studies. Although it appears to be generally accepted that once the researcher has obtained a doctorate, he/she will automatically know how to behave with integrity in the research environment, this assumption is far from the reality.

Impact of research: Another concern is that researchers very often overlook the impact of research on the environment, sustainable development, safety, security and business. In the research ethics curriculum these topics are not looked at attentively, and sometimes they are even ignored. The ensuing question is: *Who should look at what?* It is also alarming when the drive for the commercialisation of research is more about making profits than developing the scientific basis of a discipline. Greed is no virtue at all – in fact, using research only for profit may be seen as slaughtering the goose that lays the golden eggs.

The CUT expects that its staff and students will carry out the academic assignment with the highest ethical and scientific standards of academic integrity and performance.

Building a responsible research community: In building an ethical culture in science, one serious limitation is to think of research integrity only along the conventional lines of plagiarism, copyright, fabrication of data, uncontrolled clinical research on human subjects and possible harmful effects to the environment.

All sciences have an ethical dimension.

To start with, ethics is the science of norms and values and how these other sciences should be applied to all human activities.

All sciences have an ethical dimension and are interrelated.

Integrity is associated with the trust that peers, funders, and the public have in research, the research process and the research outputs.

With this in mind, a number of guidelines have been established regarding norms and values for a responsible research community at the CUT.

b) Guidelines for ethical conduct at the CUT

The CUT is committed to an ethical academic environment expressed through its core functions, namely teaching and learning, research and innovation, and community engagement. The CUT expects that its staff and students will carry out the academic assignment with the highest ethical and scientific standards of academic integrity and performance. *Academe* should adhere to those values that are universally recognised by the scientific community. Staff and students are also expected to live up to the institutional values of the university and the Constitution of the Republic of South Africa.

To give effect to this orientation, the following ethical principles are supported:

Paradigmatic choices: Academics should be free to select the paradigm for their academic work and to form their own findings and conclusions based on scientific evidence. These findings and conclusions should be available for scrutiny and criticism as required by the university and scientific community's principles of fairness, openness, transparency and academic dialogue. It is expected of academics that they will conduct scholarly work in a way that advances knowledge while maintaining high ethical standards.

Dictum of "do no harm": The university commits itself to the ethical dictum of "do no harm" in all its activities. The university further commits to the universally accepted ethical values associated with the protection of human life, responsibility towards animal life, preservation of the environment, contribution to safety, security and sustainable development, integrity in human interactions and relations and the association with the common good.

Unfair benefit: Staff and students should at all times avoid situations that could contribute to an unfair benefit for the individual, or behaviour characterised by greed. Although the notion of individualism is respected by the university, individualism should never be at the expense of other staff and students.

Creation of knowledge: Researchers should be committed to the creation of new knowledge that can enhance the *Vision 2020 Statement* of the university. The creation of new knowledge should promote the technology and innovation agenda of the university. It should by no means contribute to any situation where the safety and security of society is under threat.

Teaching and learning: Teaching and learning activities should be informed, relevant and contribute towards implementable and useful knowledge. No power relationship should be exercised between lecturer and student. Teaching and learning activities should be free from any form of harassment. Assessment practices should be fair and a just assessment of the newly gained knowledge of the student based on the evidence produced. This conduct relates to undergraduate and graduate education.

Postgraduate supervision: Teaching and learning at the postgraduate level should be driven from the perspective that the supervisor plays a supportive role in the student's discovery of new scientific knowledge. The supportive role should include assisting the student to delineate the research topic, to formulate appropriate research questions, to identify an appropriate research design and to develop the scientific and scholarly skills of the student. Having a supportive role implies that the different roles and responsibilities are well defined. This relationship depends on mutual commitment to the project and assignment, clear roles and responsibilities in the supervisory relationship, and regular interaction on the basis of formative assessment.

Research teams: Research teams should behave at all times according to the ethos of their professions, live up to the expressed values of the professional and academic organisations, and express collegiality and teamwork in the research that they have collectively and individually worked on.

An evaluation of risk should take a participant-centred approach, with the establishment of a threshold for normally acceptable risk.

Use of information and data: To preserve the integrity of research, researchers are obliged to report honestly and objectively, to avoid error and to disclose all important information. Objectivity in research imparts trustworthiness. This applies to both the *a priori* tasks of setting up the research and gathering the data and to the *a posteriori* tasks of interpreting and publishing the results. This is critical so that future work built on the research will continue in an objective fashion.

Obligations of authorship: It is a researcher's obligation to publish results of research so that readers may be informed and be able to build on the reported findings. The methods and results should be sufficiently and accurately detailed with an objective discussion of the significance of the research, so as to allow replication. Authorship should be in line with the Vancouver protocol. The principle of authorship is determined by an active contribution to the writing of the paper, the conceptual analysis of the paper and/or data analysis and interpretation of the paper.

Funding and grants: It is the responsibility of the principal investigator (PI) of the research team to ensure that the funding agencies' guidelines as well as the guidelines on the management and disbursement of funds provided by the university are followed scrupulously. It is not permitted to divert any research funds for personal or any other use, except in cases where the grant or contract specifically provides for this. Researchers who enter into agreements with commercial sponsors of research should familiarise themselves with the special terms of such agreements, especially those that pertain to the reporting of the results. Experiments not yet performed as evidence in support of the proposed research, are considered to be fabrication and are subject to a finding of research misconduct.

Funds and equipment: Staff and students have an obligation to use funds and/or equipment for the purposes for which they were awarded. Funds must be managed in such a way as to ensure that the budget is neither wasted nor misappropriated. Funds and equipment should be used in accordance with the awarding agency's requirements.

Risk: Key issues associated with the research on and with human participants are: evaluation of the risks and benefits of the research, informed consent, privacy and confidentiality, coercion and rewards. An evaluation of risk should take a participant-centred approach, with the establishment of a threshold for normally acceptable risk. This threshold is generally set by determining the normal range of risk a participant would encounter in everyday life. If the risk inherent in research participation does not exceed this standard, then the risk of participation could be seen as being within the threshold of normal acceptance.

Informed consent: Although partial disclosure and deception run contrary to the principles of informed consent, their use is acceptable as long as sufficient justification is provided. This justification must include that:

(a) the identification of partial disclosure/deception is the only feasible method for achieving the research objectives; (b) none of the information that is withheld would cause the participant to refuse participation if the information were provided; and (c) the level of risk involved in participation is not withheld. A participant's involvement in research-related and/or community engagement must be of their own free will.

Privacy: Privacy involves the right to decide the extent to which personal data that is not already in the public domain may be disseminated. Confidentiality involves the preservation of a participant's right to anonymity. All possible steps must be taken to ensure privacy and confidentiality of all personal information. If privacy and confidentiality cannot be maintained, it is important that this situation be identified during the process of obtaining informed consent. It is also important that privacy be treated within the boundaries of existing legislation. A guiding principle for involving participants in research, research-related and/or community engagement activities is that of voluntariness.

Conflict of interest: The key to avoiding conflict of interest has to be trust in the integrity of the individual person to disclose any situation that could lead to real or apparent conflict of interest, as well as potentially conflicting relationships between academics, researchers and their team members, students, the university, external funding agencies and external institutions, organisations and communities, including those in collaboration and cooperation with the staff and students.

Execution of discipline: Direct relationships between staff/staff and staff/students must be avoided in the context where discipline must be exercised.

Hazardous material: The use and disposal of hazardous materials for teaching and learning, research, demonstration, or other purposes whether on or off the premises of the university, but whose activities are associated with the university, will be subject to the provisions of existing legislation which must be complied with.

c) How we combat plagiarism?

1. As part of the Personal Information Management Programme (PIM)/ Information Literacy Programme, all first-year students are trained at the LIS on how to use the correct referencing and citing techniques, and the importance of recognising other authors' intellectual property.
2. In the CUT Student *Assessment Manual*, plagiarism (and the consequences thereof) is addressed extensively.
3. As part of the *Blackboard (e-Thuto)* function of e-Learning, all lecturing staff and supervisors have access to the programme *Turnitin* that combats plagiarism in student assignments.
4. Turnitin is an online application that scans a document and identify similarities to other documents. These similarities must then be interpreted by supervisors and students to determine plagiarism in the document. In many cases similarities may not be plagiarism as such, and can be minimised with improved academic writing skills. The CUT assists postgraduate students, supervisors and staff with access to Turnitin to submit articles and scripts for Master's or Doctoral dissertation.

d) Ethical clearance

Research ethics is of the utmost importance as it portrays institutional and individual credibility and integrity. Research involving human participants is based on a moral commitment to advancing human welfare, knowledge and understanding, and to exploring cultural dynamics. This has become prominent especially where large-scale trials conducted in developing countries are concerned.

Of fundamental importance is the duty to conduct scientifically sound research while acting in the participant's best interests and respecting and protecting the participant's autonomy. Issues of informed consent are of particular importance, as specified in the Constitution of the Republic of South Africa of 1996.

Of fundamental importance is the duty to conduct scientifically sound research while acting in the participant's best interests and respecting and protecting the participant's autonomy.

e) CUT policies

The following policies direct research:

- Policy on Financial motivation of Researchers for Accredited Research Outputs
- Policy on the Regulation and Recruitment of and Awarding of Grants to Postdoctoral Research Fellows
- Policy on Ownership of Equipment bought for Research Projects
- Policy of Surveys at CUT
- Policy on Sabbatical Leave and Industry Exposure
- Language Policy
- Policy and procedure on the Vice-Chancellor's Excellence Award
- Intellectual Property Policy
- Admission Policy
- Code of Ethics for Employees
- Code of Research Ethics and Integrity
- Policy on Plagiarism
- Examination Procedure
- Other scientific misconduct

Policies and forms are obtainable from the CUT Intranet and are in a continuous process of revision and update.

f) List of forms

Listed below are forms in areas of compliance to research policies:

Application for Research Related National and International Travel and Study Visit	LS 25
Claim for Travel & Subsistence Allowance	LS 30
Claim for expenses paid by an employee	LS 30.1
Statement of independent work	LS 118.2
Progress Report for M and PhD students	LS 179.3
Application form: Recognition of prior learning	LS 236
Application for approval of Master's, Doctoral, Postdoctoral and Staff research projects	LS 262 a
First-time application for Postgraduate Grant Award	LS 262 b
Application for the renewal of Postgraduate Grant Awards	LS 262 c
Amendment of title of a treatise/dissertation/thesis	LS 263
Appointment/Amendment/Addition of a Supervisor/Co- Supervisor	LS 264
Appointment/Amendment of Examiners	LS 265
Research Grant Scheme Acceptance Form (Agreement)	LS 280.1
Research Grant DATA sheet	F 281
Control Data Sheet for monthly stipends payments	F 282
Application for Sabbatical Leave	LS 288
Sabbatical Leave Agreement	LS 289

(Forms are obtainable from the CUT Intranet)

2.2.4 Other support, services and guidelines by Research Development and Postgraduate Studies

a) Submission of accredited research outputs to DHET

The Research Development and Postgraduate Studies Section submits institutional publications to the Department of Higher Education and Training (DHET) for continuous subsidy. For purposes of subsidy, the DHET recognises research in journals, books and published conference proceedings which meet the specified criteria outlined in their policy. The focus of subsidy is on 'scholarly publishing' which refers to publications by scholars (academics and experts) for a niche market consisting mainly of academics and researchers.

When moving between institutions, author affiliation should reflect the institution where research was conducted, supported and funded.

Faculties should submit all approved publication outputs for the year (n-1) (as per DHET Grant) to the Research Development and Postgraduate Studies Office by the institutional due date.

To comply, faculties need to verify that proposed publications and conference proceedings fit into the DHET accredited publication categories.

DHET does not subsidise all research outputs and the focus is on quality research and not maximum accrual of subsidy. This should be taken into consideration when recycling previously published work and dividing research outcomes between articles.

Similarly, when moving between institutions, author affiliation should reflect the institution where research was conducted, supported and funded.

Journals refer to peer-reviewed periodical publications devoted to the dissemination of original research and new developments within specific disciplines, sub-disciplines or fields of study.

b) Subsidy of books

Books refer to peer-reviewed, non-periodical scholarly or research publications disseminating original research and developments within specific disciplines, sub-disciplines or fields of study. Only books that meet specified criteria in the policy may be subsidised.

A book may be subsidised to a maximum of 10 units or a portion thereof, based on the number of pages being claimed relative to the total number of pages of the book. Please revert to the DHET requirements and instructions policy on Book Publications for a guide on unit allocation for book publications (available from the DHET website).

Evidence of the pre-publication peer review process must be provided for every book or chapter submitted for subsidy.

Dissertations and theses that have been converted into books must be clearly identified as such and there must be evidence of substantial reworking and additional research carried out.

c) Published conference proceedings and conference attendance

Proceedings refer to the published record of a conference, congress, symposium or other meeting where the purpose is to disseminate original research and new developments within specific disciplines, sub- disciplines or fields of study.

Only articles published in approved conference proceedings are subsidised. Approved conference proceedings are those which appear in approved journal lists or other approved indices or those which meet the criteria laid out in the policy.

Where proceedings are published in approved journals, the output will be treated as a journal article. Kindly refer to the DHET website (www.dhet.gov.za) for requirements and instructions on Conference Proceedings.

Evidence of the pre-publication peer review process must be provided for every conference proceeding submitted for subsidy.

d) The development of a research plan

The University has a Research and Development Plan outlining strategies to promote research development and postgraduate studies.

All relevant documents are available on the CUT website under Research and Postgraduate Studies.

e) Grants administration and resource development

The Research Development and Postgraduate Section administers various grants. The process to apply for CUT grant support is illustrated in Chapter 3 of this document.

f) Library and Information Services (LIS)

The Library and Information Services (LIS) resort under the Research, Innovation and Engagement division. The LIS, on both Bloemfontein and Welkom campuses, provide scientific core and value-added resources and services, such as document delivery and interlibrary loan services.

These services enable researchers to access a wide range of research material. Subscription to databases is paramount in building research capacity.

The LIS maintains subscription to twenty-six (26) databases allowing electronic access to more than 134,346,574 specialised full text journal articles, indexed in full text databases such as EbscoHost, ProQuest, ScienceDirect and SA e-publications (that have a wide coverage of peer reviewed journals). A total of 109,326,847 articles are peer reviewed. In terms of e-book titles, the LIS has either bought or subscribes to 33,662 e-book titles. A total of 12,534 journal titles are indexed in Journal Citation Reports (using the JCR link), which indicates the impact factor of a specific journal title, the citation trends, etc.

Throughout the year the Library and Information Services (LIS) provide assistance to postgraduate students and staff in the following ways:

- provision of in-depth and complex information searches on behalf of the postgraduate student/staff;
- provision of customised information searches for all faculties on both Bloemfontein and Welkom campuses; and
- provision of *RefWorks* and database training, including the functions and use of full text database, Internal Auditing Database training, PhD Database training and specific training for postgraduates.

Please make an appointment with your faculty's designated Information Librarian for more information on how to access these facilities and information searches:

Research books available in the LIS

There are currently more than four thousand research-related books shelved on the first floor, postgraduate research support section of the LIS, on the Bloemfontein Campus.

The supportive books fall within the following fields:

- the research process
- research method/methodology
- research writing/scientific writing
- research ethics
- research support

CUT Institutional Repository

An Institutional Repository (IR) is an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. In the main they include dissertations, journal articles, conference papers and chapters of books. IRs are now commonplace in academic institutions of learning worldwide. The main function of an IR is to capture, preserve and provide access to scholarly works of an institution. The IR is part of the "Open Access Movement" that seeks to promote free access to scholarly works. Distribution of low-cost technology internationally has helped to advance open access to scholarly 'publications'.

As part of the *Blackboard* function of e-Learning all lecturing staff and supervisors have access to the SafeAssign programme to combat plagiarism.

There is a variety of benefits to be delivered from an IR. Among them are the following:

- i) preservation of the intellectual output of an institution
- ii) promotion of online access to scholarship
- iii) enhancing/showcasing the profile, integrity and public value of an institution
- iv) reducing the monopoly of commercial publications to access scholarly works
- v) bringing economic relief to institutions and individuals who otherwise have to rely on subscription/purchasing to access intellectual outputs
- vi) improving the impact factor (citations) of academic works
- vii) potential to promote networking and collaboration among academics from different institutions.



CHAPTER 3

Grant support by Research Development
and Postgraduate Studies

Grant support by Research Development and Postgraduate Studies

3.1 Scholarship and grant applications

Availability of grants is subject to the university’s annual budget. Policy guidelines and submission dates are set by the Scholarships and Grants Committee. Consult your Faculty Research Manual for more faculty- specific details.

Process to apply for a CUT Research Grant:



3.2 External research funding

Every year research councils, foundations and other external bodies make grants available in various categories. Grants and bursaries are awarded to students, staff and rated researchers on a competitive basis to applicants who comply with a specific set of criteria during that period of funding. The following research councils/foundations award grants:

Agriculture Research Council (ARC)	www.arc.agric.za
Council for Scientific and Industrial Research (CSIR)	www.csir.co.za
Medical Research Council (MRC)	www.mrc.ac.za
National Research Foundation (NRF)	www.nrf.ac.za
Water Research Commission (WRC)	www.wrc.org.za

Guidelines for application to external research grant agencies:

1. Each faculty takes responsibility for the quality and scientific merit of grant applications. The AD: RIE, in consultation with the applicant, supervisor and/or HOD will recommend to the Research Development and Postgraduate Studies Section the approval of the grant to be submitted for external evaluation.
2. In cases where financial commitment is required (from the university to the funding agency) the application document must be submitted to the Research Development and Postgraduate Studies Section, in hard copy, ten (10) working days before the submission date.
3. In cases where administrative support is required, the application document must be submitted to the Research Development and Postgraduate Studies Section five (5) working days before the closing date for submission.
4. In cases where academic staff secure outside funding or other resources (such as sponsored visits, grants, awards, equipment, funding assistance, etc.) without any university support, but where resources will be utilised as part of their research assignment at the CUT, the Research Development and Postgraduate Section should be notified within 10 working days after the approval/ allocation of such resources for record-keeping (and reporting) purposes.

Steps in the external funding process





CHAPTER 4

Steps in research planning

Steps in research planning

The following can be regarded as important steps in research planning:





CHAPTER 5

Steps and stages in the postgraduate experience

5.1 Understanding the Postgraduate Journey: what determines success in postgraduate studies?

The research process is one of interaction and support. No student can be successful without the support of his/her supervisor and the administrative assistance of the university. It is also important that postgraduate students be well acquainted with the processes and procedures of a university.

The National Qualifications Framework (NQF) prescribes the *core values* of a postgraduate qualification as: a comprehensive grasp of the discipline, critical understanding of advanced research methodologies, independent research, ability to conceptualise, advanced information retrieval, communication of research results, intellectual independence and the capacity to critically evaluate own and others' work. These values are the qualification descriptors and part of the assessment criteria for postgraduate research and supervision.

The *National Skills Development Strategy* and the *Human Resources Development Strategy* address the shortage of skills in the labour market and how postgraduate education, amongst other things, can address this shortage.

Core values of a postgraduate qualification are:

- Comprehensive grasp of a discipline
- Critical understanding of advanced research methodologies
- Independent research
- Ability to conceptualise
- Advanced information retrieval
- Communication of research results
- Intellectual independence
- Capacity to critically evaluate own and others' work

Postgraduate students are regarded as one of the most important resources within a university contributing to the development of new knowledge, as they are actively engaged in research.

5.2 What constitutes the Master's and the Doctoral degree?

5.2.1 The Master's degree (NQF Exit Level 9)

Purpose and characteristics

A Master's degree is an advanced academic degree granted to individuals who have demonstrated a mastery or high-order overview of a specific field of study, or area of professional practice. Within the area studied, graduates are posited to possess advanced knowledge of a specialised body of theoretical and applied topics; high order skills in analysis, critical evaluation or professional application; and the ability to solve complex problems and think rigorously and independently.

Admission requirements

Admission at the CUT to a Master's degree is subject to the approval of the head of department.

The admission and selection criteria, including the faculty and programme requirements and the number of admissions per programme and/or qualification, as proclaimed by Senate, may vary from year to year, from campus to campus, and from programme to programme, depending on the number of applicants and their qualifications, as well as CUT's Enrolment Plan for that period.

Duration

The minimum duration of the learning programme for a Master's degree at the CUT is one year of fulltime study or two consecutive years of part time study. Any person enrolled as a student at the CUT, while also holding a position at a place of work in terms of the Labour Relations Act (Act 66 of 1995), is considered to be a part time student, while any other student is considered to be full time. Except with the special permission of the Senate, a candidate may not be registered for a Master's degree for a period exceeding four years. Students are advised to consult the CUT *Calendar/Yearbook* for full details. (Obtainable from CUT Intranet.)

5.2.2 The Doctoral degree (NQF Exit Level 10)

Purpose and characteristics

A Doctorate is an academic degree or a professional degree that, in most countries, qualifies the holder to teach at university level in the specific field of his or her degree, or to work in a specific profession.

The term *doctorate* comes from the Latin *docere*, meaning "to teach." The "licentiate" degree shortened from the full Latin title *licentia docendi*, means "teaching license".

Doctoral degrees are the highest academic qualifications students and scholars of a subject area can earn. The Doctorate is generally awarded for a significant and original contribution to a field of study, outstanding scholarly or professional work, and the highest level of mastery in a particular subject. However, there are varying views on what constitutes a 'quality' doctoral degree.

According to the HEQF, a doctoral degree requires a candidate to undertake research at the most advanced academic levels culminating in the submission, assessment and acceptance of a thesis. The defining characteristic of this qualification is high-level research capability, and a significant and original academic contribution at the frontiers of a discipline or field. The work must be of a quality to satisfy peer review and merit publication. The degree may be earned through pure discipline- based, multidisciplinary research, or applied research.

Admission requirements

Admission at the CUT to a Doctoral degree will be subject to the approval of the head of department. No person may register for a Doctoral degree unless he/she is in possession of an appropriate Master's degree or equivalent qualification, as approved by the Senate, provided that the Senate considers the standard of study to be sufficient. Selection criteria to a doctorate would include the quality of the Master's thesis in terms of language proficiency and skills in scientific writing. Furthermore, the relevance and quality of the Doctorate degree research proposal and the compatibility of the proposal with the CUT's research clusters are determining factors. The minimum duration of the learning programme for a doctoral degree is two consecutive years of fulltime study or three consecutive years of part time study. Any person enrolled as a student at the CUT, while also holding a position at a place of work in terms of the Labour Relations Act (Act 66 of 1995), is considered to be a part time student, while any other student is considered to be full time.

Duration

At the CUT, the achieving of a Doctoral degree requires a minimum of two years' full-time study, usually after completing a Master's degree. A graduate must be able to supervise and evaluate the research of others in the area of specialisation.

The student registers annually until the Assessment and Graduation Unit confirms that the qualification has been achieved. A student registered for longer than the required minimum duration of study is required to pay an extension fee upon registration, as determined annually by the CUT. Except with the special permission of the Senate, no candidate may be registered for a doctoral degree for a period *exceeding five years*. Please consult the *CUT Calendar/Yearbook* for full details. (Obtainable from CUT Intranet.)

Below are a number of applied competencies that indicate the final level of expected research outcomes to be attained at postgraduate level based on the South African National Qualification Framework (NQF) <https://www.saqa.org.za/>:

The student adequately demonstrates ...

1. expertise and critical knowledge as well as the ability to conceptualise and being creative in generating new knowledge or practice;
2. an ability to interpret scholarly debates and literature in the area of study or practice;
3. an ability to identify and apply methods, techniques, processes, systems or technologies creatively and innovatively;
4. an ability to apply specialist knowledge and theory in critically reflexive, creative and novel ways to address complex practical and theoretical problems;
5. an ability to identify, address and manage emerging ethical issues, and to adhere to ethical decision-making, including monitoring and evaluation of the consequences of such decisions where appropriate;

6. an ability to make independent judgements about managing incomplete or inconsistent information or data in the process of analysis and synthesis;
7. an ability to produce and defend substantial, independent and publishable scholarly work which meets international standards;
8. an understanding of theoretical underpinnings in the management of complex systems to achieve systemic change and, where applicable, to independently design, sustain and manage change within a system or systems;
9. an ability to illustrate intellectual independence, research leadership and the effective management of research;
10. an ability to operate independently and take responsibility for his/her work.

5.2.3 Considerations before registration

a) Drafting a protocol

A research protocol is a planning document. It embodies the thinking about the beginning, process and outcome of the study. In the research protocol you outline how the research will be conducted.

The process for drafting a research proposal:

Idea/draft topic → identified supervision →
research problem/question research protocol →
approval → research process...

Normally a research proposal has the following elements:

- a working title
- background/rationale
- literature study
- research problems and objectives
- research design
- research methodology/methods
- discussion and conclusion
- time-frame
- outline of chapters
- references
- budget and resources

The protocol should be of a high standard and should include:

- a clear and informative problem statement;
- a clearly identified target audience;
- a well-organised and well-presented layout;
- a detailed explanation of research questions and aims;
- a title that reflects the contents of the study;
- compliance with the CUT's language policy; and
- a critical aspect to the study.

Each research project should be managed as an independent study.

A faculty should verify whether there is duplication of a study, against a kept list of registered titles. Moreover, faculties would accommodate SET themes, ensuring that the proposal fits into one of the identified programmes and clusters of the university.

The AD: RIE will assist with the full set of documentation, the procedures regarding the Research Proposal/Protocol, the identification and appointment of a supervisor, and the agreement between the student and the supervisor.

Identified supervision

In view of what research is and the role of the supervisor in postgraduate studies, it would be safe to say that postgraduate supervision is the active engagement of a supervisor in assisting the postgraduate student to identify a line of inquiry, to delineate the scope of a project within that line of inquiry, and to provide guidance that will lead to successful completion of the project and the dissemination of results.

The supervisor is instrumental in the student's drafting of a protocol in the following ways:

- The supervisor provides guidance and feedback to the student.
- The supervisor provides information regarding administrative procedures.

Postgraduate supervision is the active engagement of a supervisor in assisting the student to identify a line of inquiry, to delineate the scope of a project within the line of inquiry, and to provide guidance that will lead to successful completion of the project and the dissemination of results.

The supervisor debates the contents of the research project and provides perspective on the broader context of existing theories and latest trends in the field of study.

Supervisor/Student relationships and roles

- The supervisor should be available, knowledgeable about the subject field, helpful, critical, enthusiastic, involved, objective, and should stimulate ideas.
- The supervisor is an ADVISOR on research conduct and ethics, time management, overall goals, objectives and on the scope of the study.
- The Supervisor is an EXPERT GUIDE and MENTOR on the selection of a topic, relevant literature choices, theoretical frames of reference, and research methodology.
- The Supervisor is the "QUALITY CONTROL" for progress and project content, and does this by means of constructive feedback.
- The Supervisor is a PASTOR by being a *sounding board*, being sensitive to personal matters and being alert to a student's personal strengths and limitations. The supervisor is committed to the student's success.

The student

- adheres to the research contract/agreement;
- initiates contact and requests meetings in advance;
- is up to date with all institutional and formal requirements and rules (via the CUT *Calendar/ Yearbook* and the CUT *Student Assessment Manual*);
- maintains interest and commitment throughout the study;
- plans and executes the research independently and with rigour.
- informs the supervisor of problems affecting the progress early in the project – there is openness and honesty from the beginning; and
- ensures that thesis drafts are dated, typed and spell-checked, language edited and meet all technical requirements in the required format of the thesis/dissertation.

Golden rules of engagement between supervisors and students

- Dignity, respect and courtesy
- No (emotional, intellectual or sexual) harassment
- Accessibility
- Privacy
- Honesty

Students are advised to make optimal use of their time and effort during scheduled supervisory sessions. Students who don't schedule frequent meetings tend to overload the supervisor, expecting feedback on short notice.

It is always good to keep in mind that supervisors have no miracle solutions or suggestions and are not a substitute for reading up on a wide variety of topics in your field.

Some students hand in inferior efforts and expect the supervisor to make/highlight all the corrections; moreover, they often don't make the recommended corrections. This is not supervision...

The first meeting with the supervisor: laying the ground rules

The supervisor plays an essential part in the postgraduate journey. Make sure that a good relationship is established initially, and that clear ground rules are laid down. Discuss the Memorandum of Understanding (MOU) with your supervisor during the first meeting.

Before committing to an MOU consider the following checklist:

Supervision	What does supervision mean?
	What are the stages of the process?
	What are the student's and the supervisor's responsibilities?
	What sort of feedback will the supervisor give: how often, how much, what form?
Project Management	What is involved in the development of a research proposal?
	What research skills, statistical analysis or other technical skills are required for the research?
	What is the appropriate length, structure and presentation of the research proposal?
	What are the stages of the research process (a rough guide to the time that should be allowed for each stage)?
Meetings	Frequency, duration, structure and location of meetings?
	What kind of access does the student have to the supervisor apart from scheduled meetings?
	Whose responsibility it is to schedule meetings?
	If someone cannot attend a scheduled meeting, what is the correct procedure to follow?
Dissertation/Thesis	What would be a realistic completion date to aim for, given all the information discussed?
	What is required regarding the editing of chapters?
	What are the requirements regarding draft chapters?

Establish a good communication habit with your supervisor, for example, write down whatever was resolved at the last session, and what will be expected for the next. Frequent feedback and communication with your supervisor is essential at reasonable turn-around times.

If you have agreed on a due date for a piece of work, work very hard to keep to it. Do what you said you would do.

Supervisors want to maintain a very high standard, so don't force your supervisor to let you hand in for assessment if he/she doesn't propose or approve it to be ready for submission yet.

Keep in mind that your article submitted to a journal (as attachment to your thesis) assists as a "pass" in your final assessment.

Common mistakes

The distinguishing mark of graduate research is an original contribution to knowledge. To this end, the thesis must show two important things:

- identification of a worthwhile and relevant problem or question which has not been previously answered; and
- a solution or answer to the question.

The first most common mistake postgraduates commit is to not READ enough books, research reports/theses/dissertations, and scientific articles. Consequently, some try to 'hide' what has already been done in other similar studies and try to pose it in a thesis as a new idea. The mastery of the theory in the field of study along with a wide spectrum of knowledge on the most recent research results are the foundation of a good thesis.

Another common mistake is that some students underestimate the importance and long-term value of a protocol. The protocol encapsulates most of the "conceptual thinking" and forms the basic framework of the thesis.

The mastery of the theory in the field of study along with a wide spectrum of knowledge on the most recent research results are the foundation of a good thesis.

Students should not underestimate the work involved in acquiring a Master's or a Doctoral degree. There are no shortcuts.

It is common amongst students, when drafting a protocol, to tend to 'hide' possible problems that could hinder the study. Problems are much easier to rectify beforehand than during or after the study. Any unidentified problem will surface eventually. Rather anticipate and analyse as many potential risks as possible during the drafting of the protocol. Statements/hypotheses can be proved either right or wrong after the research is completed. Don't force a 'right'! The purpose of the protocol is to see to it beforehand that every applicable aspect of the research was clearly planned and thought through.

A last common mistake is the tendency to become side-tracked during the research process. Stick to the topic and the protocol. It should be a topic of real interest, and after proposing the protocol, it should be put into action with dedication, consistency and clear focus.

Best practice

Start with a good protocol and a good supervisory arrangement/ agreement. The supervisor/ promoter must preferably be located close to you so that frequent visits/communications can take place.

Avoid overloading your supervisor with a reading assignment (to read an unedited chapter, for instance) and requesting immediate feedback, on short notice. Agree beforehand on reasonable turn-around times and stick to these.

Use one method of referencing, and use a logbook to document every detail correctly from the start.

Ensure that the title, objectives, arguments and research procedures correlate with one another; are linguistically properly formulated and logically appropriate. Ensure that the abstract and titles are in exact unison.

It is always good to keep the title-phrasing option open until the end of the project. The project could start with working title. During the last phases of the project, the title could be more accurately formulated.

The title should reflect the problem statement. You cannot conclude on something that the topic does not explicitly state.

A self-review is good practice. Be critical of yourself during the research process. Ask yourself "so what?" in relation to everything: this is a good practice to develop independent thinking.

The Library and Information Services (LIS) of the CUT should be your second home. Make use of the specialised database searches that are offered by librarians.

Attend the RefWorks workshop training, at the LIS, presented to postgraduates on how to access databases from the CUT's website, and how to apply automated citations from the RefWorks programme. These workshops are offered throughout the year.

The Library and Information Services (LIS) should be your second home. Make use of the specialised searches that are offered by librarians.

Requesting consent to conduct surveys with CUT staff and or students.

CUT procedure:

- a) Student need to apply for permission to conduct surveys at the CUT campuses.
- b) The submission should convey the following:
- c) Survey purpose/research proposal
- d) Ethical considerations including privacy legislation
- e) Questionnaire
- f) Sampling procedure

Only when the complete application is submitted through the Office of Institutional Planning and Quality Enhancement, will the CUT provide the applicant with a decision and conditions in this regard.

Procedures regarding extension of residency periods according to CUT Policy.

Extension of residency period

- a) Applications for the first time extension of residency periods at postgraduate level must be approved by the Executive Committee of the relevant Faculty Board and ratified by the University Research and Innovation Committee. Second time extension must be approved on recommendation from the URIC by Senate.
- b) Before a student can register for a specific year there needs to be an assessment of the student's performance. The assumption is that such an assessment will ensure that student who progressed beyond the residency period will have valid reasons for doing so.
- c) Students should carefully note the stipulations in the CUT CALENDAR and CUT ASSESSMENT MANUAL to comply with all regulations and procedures.

The Postgraduate Research Journey

Many students postpone or end up avoiding postgraduate studies, often due to misperceptions on what the journey entails. The purpose of this map is not to furnish you with a recipe or rigid process but rather to offer a roadmap to guide you in how to position yourself for an effective postgraduate experience. The map guides you through the different milestones and processes during your journey from *matchmaking* up to *graduation and research uptake*.

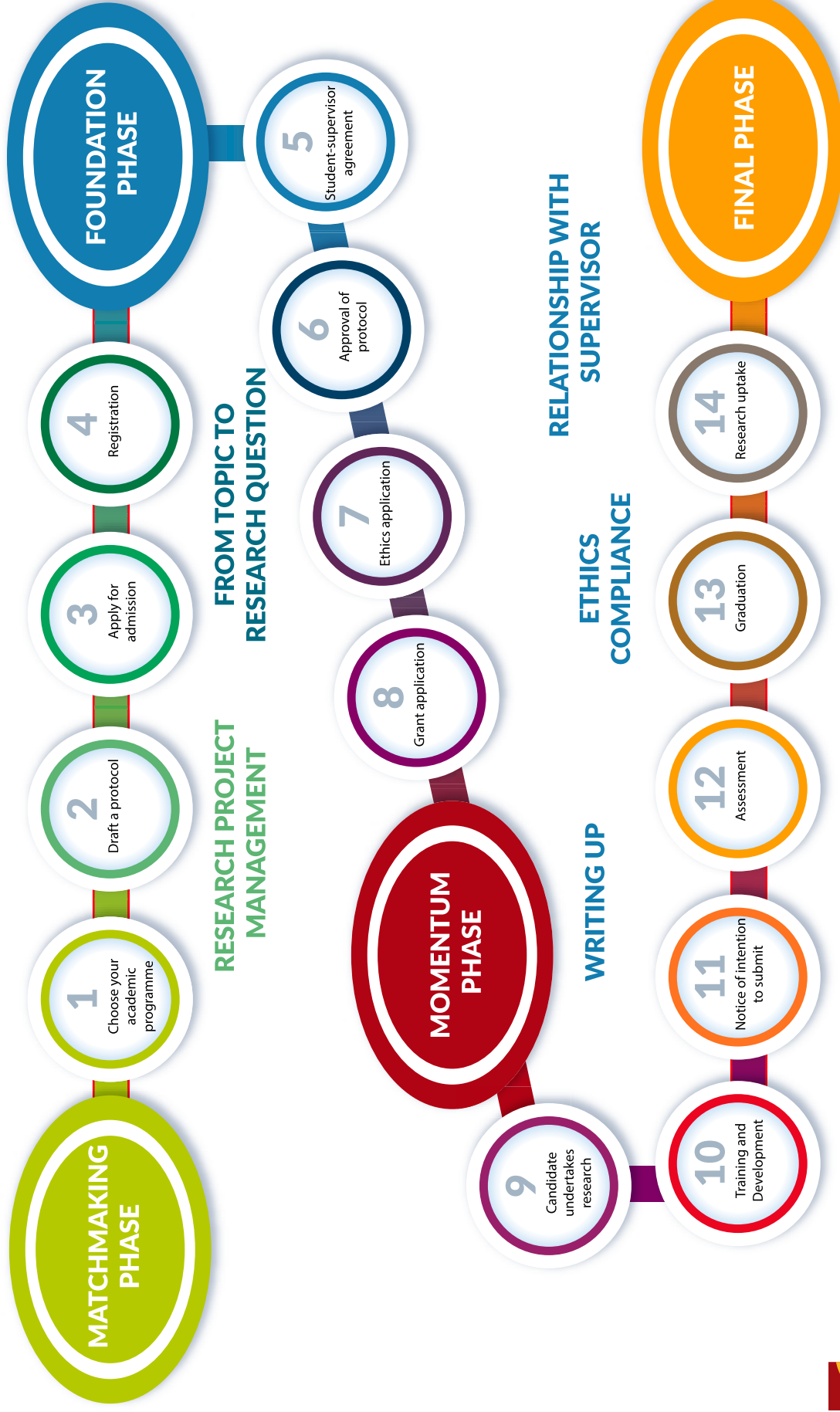
Postgraduate students are regarded as one of the most important resources within a university, contributing to the development of new knowledge as they are actively engaged in research. Hence, we consider three fundamentals during the postgraduate experience: institutional, learning, and personal.

The Postgraduate Research Journey

LEARNING

INSTITUTIONAL

PERSONAL



Institutional: A university system which supports and underpins developmental research, contribution to new knowledge and meeting the demands set by the knowledge society.

Learning: Prospective students are expected to develop their project proposal and to indicate what they can identify and ask as research questions. They must read in an exploratory way, finding their way through the field, identifying theories to underpin their work, and assimilating the previous and current critical work in that field.

Personal: Existing and prospective students often do not realise that the acquisition of research skills and competencies is a process of growth that requires dedication and perseverance. The attitude of students should be one of willingness and flexibility in the quest to acquire new skills and competencies to become a scholar in one's own right.

Steps and phases in the postgraduate journey

MATCHMAKING PHASE

Postgraduate studies focus on research development which relies profoundly on building relationships and working together with people during your research journey.

A comprehensive choice of postgraduate programmes is offered across the four faculties, while we provide platforms for critical thinking and intellectual debate across many fields and disciplines.

STEP 1 - CHOOSE YOUR ACADEMIC PROGRAMME

It is a good idea to research your desired career path thoroughly before you decide on the next step. Make an informed decision when choosing your degree.

Below are some general tips for choosing the right degree:

#1 - Know WHAT you want to do

Choosing a postgraduate degree means thinking about how you want to study it – and what style you want to learn in. Postgraduate degrees are much more specialised, as opposed to undergraduate.

It's essential to choose a field you're passionate about and a programme that caters for your needs.

#2 – Know WHY you want to do it

Make sure you are undertaking a postgraduate degree for the right reasons. Don't be tempted to pick a degree just because you feel it might look good on your CV.

#3 – Get as much information as possible

A university's website is a great place to start looking at the degrees available to you – staff will be happy to answer any questions you may have about the degree and how your prior experience may fit with the curriculum.

#4 – Don't just rely on the Internet

Most universities present open days, with participating departments providing staff to answer specific questions. The aim is to provide a platform to postgraduate students to get to know their potential supervisor to discover if you share the same interest and approach.

#5 – Think about HOW you'll fund it

Postgraduate study can be expensive bearing in mind your entire tuition fees and living costs while studying. Contact the university you apply to and find out what kind of funding support they offer.

6 - Project Management

Students invariably underestimate the time involved in completing a Master's or Doctoral degree. It is easier for full-time students who devote all their time to the study. When you're scheduling, be realistic, and plan within the customary parameters.

FOUNDATION PHASE

STEP 2 – DRAFTING A PROTOCOL

By this stage, you may have obtained enough information to make an informed decision on the programme you want to study. Applicants are advised to consult the faculty or department to discuss their research project before submitting their applications. You will be referred to a potential supervisor. Prepare a short draft research proposal that outlines the kind of research that you are interested in. Explain how it builds on prior research and how it connects with the potential faculty/department. Each faculty or department will have their own requirements for what is expected, and you should ask if there are specific requirements, but it is worth developing your ideas along the guidelines in section 6.2.3 of this manual before you contact the university or department.

TIP: You will probably also be expected to have a preliminary proposal ready in the "matchmaking" phase or as part of your application.

STEP 3 - APPLY FOR ADMISSION

Applications for Master's and Doctoral degrees are considered throughout the academic year. Admission requirements vary from one programme to another. For both Master's and Doctorate, the Assistant Dean will verify if you qualify for the programme you intend to study.

All students who wish to start with further postgraduate studies must complete the "Internal Application for Admission" form prior to the intended first year of study for the new degree. The forms are available online or at the Assistant Registrar: Academic Structure and Student Enrolment Services. A non-refundable application fee is payable with each application for admission. Academic Structure and Student Enrolment Services is the central administrative support service unit that provides academic administration processes to the core business of the institution, namely:

- application for academic admission,
- communication,
- enrolment,
- proof of enrolment/registration, student records.

Note: You are not officially a CUT postgraduate student until you are registered.

STEP 4 – REGISTRATION

Registration for a Master's or Doctoral degree is completed in the faculties. You will be allocated a supervisor by the relevant head of department. Registration involves getting signatures from your supervisor and HOD. In some faculties, prospective students are required to research and formulate a complete research proposal before they can register, whereas other faculties allow students to register and then formulate their research proposal, already under the supervision of an academic in the department. Some faculties require students to do an oral presentation of their proposal at departmental level before registration. Familiarise yourself with the processes, regulations and deadlines applicable to the specific department and faculty. Registration also requires a signed agreement between the supervisor and the student.

MOMENTUM PHASE

STEP 5 – SIGNED AGREEMENT

Your department is the place where you will most actively engage with your research theme and it is also responsible for managing your postgraduate degree. To this end, engage with your supervisor(s) about the code of conduct. You are normally required, upon registration, to sign a student-supervisor agreement. The agreement sets out the expectations and responsibilities of the student and the supervisor, the deliverables of both parties, and the milestones and timeframes in your research journey. Each faculty may have their own.

TIP: Consider the checklist on p 56 before committing to this agreement

STEP 6 – APPROVAL OF PROTOCOL

Your research protocol marks a major milestone within the research journey. Your supervisor will guide you to formalise the protocol. Your research topic and protocol must be submitted to the FRIC for approval, after which the Title Registration Committee registers the title on the faculty's database. FRIC submits the approved protocol to the Faculty Board for ratification. The Assistant Registrar: Assessment and Graduation is notified accordingly in view of informing the applicant, the supervisor, the head of department, the relevant Dean and Library and Information Services of the approved project title.

TIP: A Master's or Doctoral student who has registered for a degree will automatically be deregistered if the protocol and LS 262 form are not approved within six months (in the case of full-time students) or one year (in the case of part-time students), respectively.

STEP 7 – ETHICS COMPLIANCE

All Master's and Doctoral candidates are required to apply formally for ethical approval at the Research Ethics and Integrity Committee (REIC) before collecting data. Each faculty has its own procedures for ethical approval. The supervisor will guide the student regarding the administrative processes. Section 2.2.3 of this manual provides a broad overview of "Research Ethics and Integrity".

TIP: The REIC typically meets at specified times through the year, so take these dates into account in your project planning. Waiting for ethics approval can really hold up your research – be sure to build in the time and follow the correct steps.

STEP 8 – GRANT APPLICATION

Student applies for grant with the guidance of the supervisor. The approval of the grant is based on institutional and faculty-specific criteria. Student formally accepts the grant conditions. Grant registration on Research Administration System. Pay-out of funding is subject to the submission of satisfactory progress reports approved by the supervisor.

STEP 9 – CANDIDATE UNDERTAKES RESEARCH

Data can now be collected and analysed. Although each thesis or dissertation is unique, they all have similar components. The minimum general requirements pertaining to the layout and format of theses/dissertations/treatises are summarised in the *Postgraduate Assessment Policy*. The functions and requirements of each component may vary according to your field of study, level of postgraduate study and the research question you are attempting to answer. Structure is important in academic writing because it helps to make your ideas clear, guides the reader's understanding and can strengthen your arguments. Engage with your supervisor about the structure and components that you need to include in your thesis or dissertation.

TIP: Keep your supervisor updated on progress and any difficulties. Meetings with your supervisor should ensure you are on track with your initially agreed milestones and deliverables.

STEP 10 – TRAINING AND DEVELOPMENT

The Graduate School provides various training initiatives which aim to develop postgraduate students' and staff members' specific research skills. Participating in these events is an important step in your research journey and can help you to enhance your personal impact and that of your research. Check our Events Calendar for workshops and seminars and diarise these dates.

FINAL PHASE

STEP 11 – NOTICE OF INTENTION TO SUBMIT

Subject to the approval of the supervisor/promoter, the candidate must give at least three (3) calendar months' written notice to the Assistant Registrar: Assessment and Graduation and the relevant head of department of his/her intention to complete and submit the research report for assessment purposes. Consult the Postgraduate Assessment Policy for specific guidelines for submission of thesis/dissertation.

TIP: You should ensure that your thesis demonstrates a high standard of copy editing and proof-reading. You will therefore need to check your thesis for accuracy, paying attention to spelling, grammar and sentence structure. You will also need to double-check layout, references, cross-references and numbering. It is not always easy to see errors within your own work and **your supervisor is not expected to edit or proof-read your thesis.** Your supervisor may recommend that your thesis be professionally proofread or edited.

STEP 12 - ASSESSMENT

TIP: Assessment takes two forms: formative assessment and summative assessment.

Formative assessment is the continuous evaluation and feedback to the student during the study. Summative assessment is the final assessment of the study. Doctoral candidates may be required to defend their thesis/dissertation in an oral assessment. Consult the CUT Assessment Policy for regulations regarding assessment procedures.

Assessment is by a panel of Assessors appointed by the Senate. An Assessor may require resubmission of a thesis/dissertation after amendments have been made. Before a dissertation/thesis is finally approved and the candidate can graduate, all amendments should be made to the satisfaction of the supervisor and examiners.

STEP 13 - GRADUATION

After having revised and/or improved a Master's or Doctoral study as recommended by the assessment panel, the student must, at his/her own cost, submit bound copies thereof to the Assessment and Graduation Unit, via the head of department concerned, before the qualification can be awarded. The Assistant Registrar: Assessment and Graduation is responsible for organising the graduation ceremony and communicating details and invitations.

STEP 14: RESEARCH UPTAKE

Unless research results are beneficial to society and disseminated, one can argue that the research was wasteful. Research uptake is critical to professional career development. The results of a Master's or a Doctoral study must add value to society. The success of researchers depends on the ability to make consistent contributions both to science and to the profession. Research uptake is widely interpreted as the distribution and implementation of research findings. Dissemination is typically achieved by journal articles and conference proceedings. Application is informed by the research results, also called technology transfer or innovation

The Doctoral value chain

The University's approach to postgraduate studies can be summarised as a Doctoral 'value chain'. The 'value chain' covers quite a number of the attributes and outcomes required at postgraduate level. As this (the 'value chain') is a unique 'instrument' to the CUT (although not officially approved) it can be mentioned that it is increasingly developed and refined via participative processes so that all postgraduate students and supervisors may eventually have a common understanding/view of the required attributes and outcomes at postgraduate level. From the perspective of the CUT 'value chain' four objectives apply (see Figure 1 below):

- Postgraduate students must understand the research process, starting with a research problem and ending with the solution(s). The research must involve a literature review or literature scope, identifying and using an appropriate research methodology that contributes to providing evidence to solve or address the identified research problem.
- Postgraduate students are trained to self-assess their research and apply critical and analytical research skills.
- Postgraduate research attributes such as demonstrating research integrity, project planning and application for funding are part of executing research.
- Postgraduate studies at the CUT must have relevance for business and industry.

Figure 1 indicates the elements associated with the research 'value chain'. Although this is not an approved institutional model, it represents a common understanding of how value is added to the postgraduate research process.

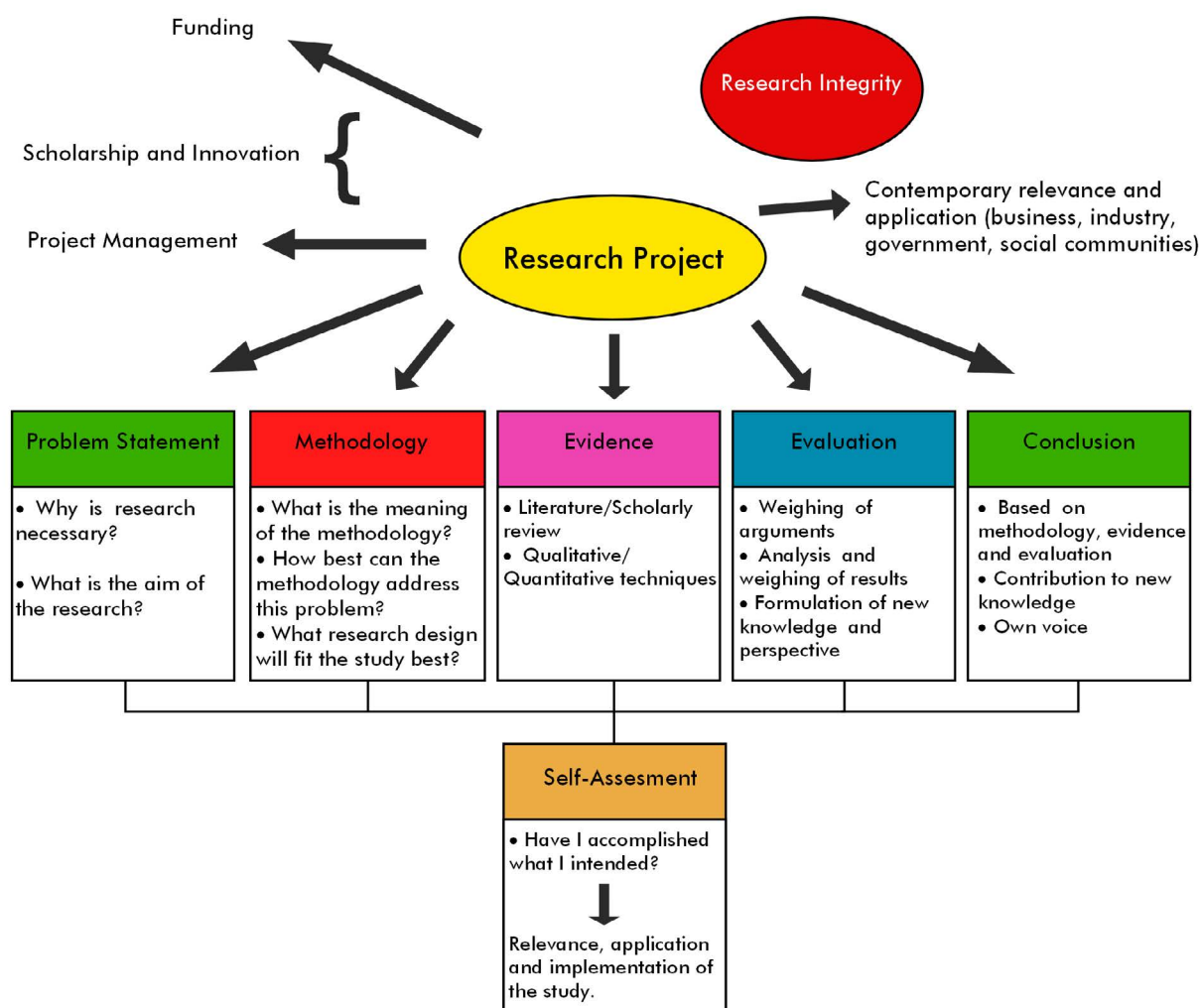


Figure 1: Doctoral value chain

5.3 Scholarship

For centuries the term *scholarship* has had a very narrow definition. Today it is more broadly associated with methods, discipline and competence in research, and with mastering knowledge in close proximity with integrity and ethical values. Scholarship refers to the body of principles and practices used by researchers. It is characterised by its significant contribution to a particular profession, work that can be documented, work that builds on the foundation of other scholars and that can be elaborated upon, and work that is open and available for peer evaluation.

5.3.1 Boyer's Model for Scholarship

In the 1990 publication *Scholarship Reconsidered*, Ernest Boyer introduced an academic model advocating expansion of the traditional definition of scholarship and research into four types. The model has been embraced across the *academe* with occasional refinement.

Boyer proposed that scholarship includes four different categories and it is to be expected that any particular individual will have different patterns of working relationships within the four categories at different times. The following table summarises the model:

Table 5: Summary of Boyer’s Model for Scholarship

Summary of Boyer’s Model for Scholarship
Scholarship of Teaching The well- informed teacher’s work becomes consequential only as it is understood by others. Involves the transfer of knowledge, practices of teaching and learning and relationships that connect teachers and learners.
Scholarship of Application Theory and practice in the field of knowledge are applied in professional and community work and connect the university with a wide variety of individuals, organisations and enterprises. It answers the question: How can it be helpful to individuals as well as institutions?
Scholarship of Integration Peers connect with one another through practices and social relationships across discipline fields. It answers the question: What do the findings of research mean?
Scholarship of Discovery Contribution, through research, to both human knowledge and intellectual climate of the University. It answers questions: What is to be known? What is yet to be found?

(Boyer, E. L. 1990. *Scholarship Revisited, Priorities of the Professoriate*: Special report of the Carnegie Foundation for the Advancement of Teaching. Princeton, NJ: Carnegie Foundation for the Advancement of Teaching)

5.3.2 Habits of successful scholars

- Scholars are curious. They ask thoughtful questions.
- Scholars spend time pondering ideas and problems.
- Scholars view ideas and problems from multiple viewpoints and perspectives.
- Scholars save ideas, and document unfinished work so that they can revert back to it later.
- Scholars exercise their intellect by trying challenging tasks.
- They include all possible resources on a specific research issue and look at families of resources.
- Scholars set both short- and long-term goals. They have a vision for their research.
- Scholars are prepared to learn and teach.
- Scholars consider themselves half-full: they exercise academic humility by realising that they have more to learn.
- Scholars realise that they can’t be both “popular and effective” at the same time, therefore they take on difficult or unpopular tasks, transcending traditional ideas, rules and patterns, feeding the debates of the day and partner with originality.

5.4 Doing research

5.4.1 Four virtues in doing research:

- a) Your project should give evidence that you have *mastered* the research problem.
- b) Correct use of language, style and grammar.
- c) Footnotes, tables, figures and data should support your problem statement.
- d) Always argue, argue and argue the point.

The research report is not about recycling or replicating or summarising previous research, but rather it is about adding something new – providing a new perspective, based on what is already known. We expand on what has already been done in the subject-field through scientific writing.

Research is a process. It starts off with identifying the problem, then doing the research, and generating results on the basis of the completed research.

The best way to start with any postgraduate study is to identify the technical requirements of the research project. Is it an Honours script/ treatise/dissertation? Is it a Master's dissertation? Is it a Doctoral thesis? What are the technical requirements for the specific task?

5.4.2 Steps in doing research

Once you have identified the requirements of your research project, employ the following steps:

Step 1:	Identify the research problem. Why do I need to do this research?
Step 2:	What is the hypothesis following on my research problem? What are the expected outcomes?
Step 3:	What research methodology (ies) will be used to address the research problem?
Step 4:	What research paradigm/framework is going to be applied?
Step 5:	Immediately start with a literature analysis. Remember that you should consult literature that will reflect the overall and most recent debates in your field of study.
Step 6:	Start with field work (data collection).
Step 7:	What are your results? Write the research results.
Step 8:	Do a self-review: Have you resolved the research problem? Can you validate your hypothesis? Does it provide a new perspective? Does it add to the field of knowledge?
Step 9:	Recommendation to business, industry, government and social communities.

5.4.3 Writing the research report

Scientific writing is all about *getting back to basics* (reviewing on the basis of what is already known). The research report is not about recycling or replicating or summarising previous research, but rather it is about adding something new – providing a new perspective, based on what is already known. We expand on what has already been done in the subject field through scientific writing.

Scientific writing is a constant process of refinement with a prominent level of reflection on materials from recent scientific accredited sources.

It is a systematic approach that requires a specific style, format and line of thought. The contents should show a prominent level of reflection, which makes scientific writing an involved process of reading and thinking over your work – again and again.

Scientific writing implies rational and logical arguments with the aim of persuading readers that the investigation was reliable and the findings are valid.

Argumentation is a writing tool. Arguments should be presented logically and purposefully, leading step by step to a conclusion. The argument is the central idea that is explored and argued with evidence to back it up. A good argument needs good evidence. Take heed that your writing presents the arguments, not the process.

The author is a creator in his/her own right. In a research project the author knows the beginning, but not the end; therefore the writing should be more descriptive. However, when writing for a publication, the author already knows the end, right from the beginning. Therefore, the contents of the publication paper should be more reflective, and less descriptive.

The conclusions drawn from the research are important, and there should be a new contribution to the discipline. The conclusion is a presentation of the new, and is not a recycling of the old. On Master's level the research project usually adds something new to the knowledge base, but is more concerned about the *problem statement* than the *evidence* and *conclusion*. On Doctoral level the research project must add something new, with the bulk of emphasis more on the *evidence* and *conclusion*. In writing an article for publication, on the other hand, the author is *reporting* on the new knowledge and the emphasis would be mostly on the conclusion.

5.4.4 What can a reviewer tell from a List of References?

The first place any good reviewer will consult, even before reading the report, is the list of references. The reviewer will note whether the references used reflect the critical leaders/authors in that subject field or not.

From here, the reviewer would be able to spot the school of thought and determine whether the paper is going to be "a *stew*" (a mixture of various schools of thought), *traditional* (only based on founding theories), or *ground-breaking* (addressing a gap in the critical and most recent aspects of the discipline field). By looking at the list of references, the reviewer should be able to determine whether this will be a good paper or not.

By looking at the list of references the reviewer should be able to determine whether this will be a good paper or not.

5.4.5 Elements of a good research report

- Every applicable aspect of research is clearly explained in the report
- Writing for a pre-determined, selected reading public or target audience
- Accurate information
- Well systematised and scientifically correct without being uninteresting
- Short and concise to make reading easier
- Well-organised and compact without losing accuracy and comprehensiveness
- The report is objective
- The report is stylistically correct and makes use of a definite referencing method, such as the Harvard Method, the Augmented Harvard Method, the Numerical Method, or the Vancouver Referencing System, depending on the requirements of the subject field.

5.4.6 Steps in scientific writing

Steps in scientific writing link with steps of the research process, starting with the research problem that was articulated after a review of the literature.

Table 6: Steps in scientific writing

Hypothesis	â	<p>A hypothesis is an assumption that you want to prove through your research.</p> <p>Example 1: Rapid prototyping techniques are an improvement in the manufacturing of industrial tools.</p> <p>Example 2: Students perceive themselves to be clients of the university.</p>
Method	â	<p>What research methods will you be using in solving your problem and proving your hypothesis?</p> <p>The following research methods can be used:</p> <ul style="list-style-type: none"> • Survey research • Causal comparative research • Ethnographic research • Correlational research • Experimental research • Evaluation research • Basic research • Clinical research • Epidemiological research • Social and behavioural research • Applied research • Creative research
Approach	â	<p>There are seven virtues in academic writing:</p> <p>Virtue 1: You argue a point.</p> <p>Virtue 2: For each argument there is at least one reason.</p> <p>Virtue 3: A reason is supported by a literature reference/case study/ experiment</p> <p>Virtue 4: You never make statements without being able to prove the statement.</p> <p>Virtue 5: Each argument can be validated.</p> <p>Virtue 6: Your argument must not only be able to support your view but also to counteract views that might differ from yours.</p> <p>Virtue 7: Your literature reference/case study/ experiment must be the latest authority on your topic.</p>
Critique & evaluation	â	<p>As you write your paper, you are continuously evaluating the arguments, always taking your problem statement and hypothesis into account. Does an argument support your problem? If not, shouldn't you revisit your problem statement and reconsider your hypothesis?</p> <p>There should be a constant alignment between the topic and the contents.</p>
Conclusion	â	<p>In the conclusion you bring your arguments to a close and explain your solution to your problem, indicating whether your hypothesis is valid or not.</p>

5.5 Other support

5.5.1 Preparatory guidelines for undergraduate and graduate students

The university's aims for research should be explained in clear terms to graduates. The research-based learning element of postgraduate studies should be clearly understood.

The following preparatory guidelines are proposed:

Consider continuation of studies on a postgraduate level.

- Consult the *CUT Calendar/Yearbook* for relevant information.
- Comply with all the requirements for registration.
- Align your envisaged postgraduate research project to the research clusters and programmes of the CUT.
- Pay special attention to the concepts and elements in the Research Methodology course that forms part of your current fourth year programme.
- Attend the supplementary research workshops that are presented at the CUT and ask as many questions as you possibly can. These workshops are designed to expose students to, and engage students in, research (accessible to all registered students, postgraduate students and staff, at no additional cost).
- Before registering for postgraduate studies, consult with the AD: RIE and head of department as a first entry point to assist you with identification of a research proposal and identification of a supervisor/study leader.
- Find answers to the questions: What is research? Why should one do research? Why do universities do research? What are the products and effects of research in your field of study? Also read a wide variety of sources in your subject field to learn what the latest trends and research gaps are.



CHAPTER 6

Glossary of terms and acronyms

Glossary of terms and acronyms

Research for Development (R4D): has become a popular term and implies a paradigm shift: Science and innovation should be on the aid-effectiveness agenda with the net result of socio-economic and sustainable development. Research should create wealth and contribute towards quality of life.

Abstract: A synopsis that summarises the entire content. A concise overview which should only include information that is reflected in the content. It must attract and excite and should be done last. It is advised that you start your paper with a working title, then formulate the title and write the abstract once you have completed the paper. The abstract is used to help the reader quickly ascertain the paper's purpose. When used, an abstract always appears at the beginning of a manuscript or typescript, acting as the point-of-entry for any given academic paper or patent application.

Affiliation of claims: The principle here is that the research stays where it was done. It belongs to the institute where the work was done.

Applied research: Original investigation undertaken in order to acquire new knowledge and directed primarily toward specific practical aims or objectives.

ASSAf: Academy of Sciences of South Africa

Basic research: Original investigation with the primary aim of developing more complete knowledge or understanding of the subject under study.

Book: Books refer to peer-reviewed, non-periodical scholarly or research publications disseminating original research and developments within specific disciplines, sub-disciplines or fields of study. Only books that meet specified criteria in the policy of the DHET are subsidised.

CHE: The Council for Higher Education is responsible for the development and management of the HEQSF (Higher Education Qualifications Sub- Framework) and for advising the Minister of Higher Education and Training on matters relating to the HEQSF.

CoE: Centre of Excellence – an establishment of the NRF/RISA in collaboration with the Research Chair initiative (see also the term: SARChI)

CRC: Central Research Committee, name is now changed to URIC (University Research and Innovation Committee) reflecting a broader context.

CRPM: Centre for Rapid Prototyping and Manufacturing.

CSIR: The Council for Scientific and Industrial Research (CSIR) is one of the leading scientific and technology research, development and implementation organisations in Africa. Constituted by an Act of Parliament in 1945 as a science council, the CSIR undertakes directed and multidisciplinary research, technological innovation as well as industrial and scientific development to improve the quality of life of the country's people. The CSIR is committed to supporting innovation in South Africa to improve national competitiveness in the global economy. Science and technology services and solutions are provided in support of various stakeholders, and opportunities are identified where new technologies can be further developed and exploited in the private and public sectors for commercial and social benefit. The CSIR's shareholder is the South African Parliament, held in proxy by the Minister of Science and Technology.

Curriculum: Is the prescribed courses/modules to be successfully completed before a qualification can be awarded.

CUT: Central University of Technology, Free State.

DHET: Department of Higher Education and Training.

Dissertation: Is the research report submitted in the prescribed format and in partial fulfilment of the curriculum of a Master's degree.

DST: Department of Science and Technology.

ETDP: Education, Training and Development Practices.

Ethics: See term: Research Integrity for a full definition in the research context, also see Montreal Statement.

FABLAB: An initiative of the CUT that aims at technology transfer and promotion of SET to individuals and acts as a supporting structure for PDTS.

Formative assessment: a process consisting of a variety of assessment opportunities (such as written tests, assignments and presentations) scheduled on an on-going basis and structured as part of teaching and learning during the course or module (see also term: Summative Assessment).

Frascati Research Classification of Basic and Applied Research:

- Basic research: original investigation with the primary aim of developing more complete knowledge or understanding of the subject under study.
- Applied research: original investigation undertaken in order to acquire new knowledge and directed primarily toward specific practical aims or objectives.

Footnotes vs. endnotes: Footnotes are the kind of notes that appear at the bottom of each page. Endnotes are the kind that appear at the end of the document.

FRIC: Faculty Research and Innovation Committee, a structure at faculty level through which postgraduates apply for and obtain approval for protocols, assessments, and international travel.

GAP analysis: Gap analysis identifies gaps between the optimised allocation and integration of the inputs (resources), and the current allocation level. This reveals areas that can be improved. Gap analysis involves determining, documenting, and approving the variance between requirements and current capabilities. Gap analysis naturally flows from benchmarking and other assessments. Once the general expectation of performance in the industry is understood, it is possible to compare that expectation with the company's current level of performance. This comparison becomes the gap analysis. Such analysis can be performed at the strategic or operational level of an organisation (Wikipedia).

Gibbon's Mode 2 Knowledge: This mode of knowledge production implies that knowledge production is produced in the context of application; it is trans-disciplinary of nature and responsive to societal needs.

HELSKA: Higher Education and Leadership Scarce Skills Academy.

HEQSF: Higher Education Qualifications Sub-framework.

HoD: Head of Department.

IEASA: The International Education Association of South Africa (IEASA), a non-profit organisation, was established as a result of the need for universities of technology in South Africa to respond to international educational trends. If South Africa is to remain competitive within the global economic environment it is important that our higher education provides opportunities for students to obtain a global perspective to their studies. It also means that we open up international contacts which will benefit our students, our tertiary institutions and will assist South Africa to be a competitor and participant in world markets.

Incubator/ Incubation: A CUT initiative whereby a (postgraduate) researcher may continue with the development of a product or business in a small office currently situated at the FABLAB.

INORMS: International Network of Research Management Societies.

INSA: Indian National Science Academy.

INTERIM: An in-house, non-accredited journal of the CUT that serves as a unique tool for publication of work in progress.

Integrated entrepreneurial innovative approach in research: It is the ultimate aim to make an institution financially independent through the development and production of intellectual property.

IRDp: Institutional Research Development Programme, a capacity development programme by the NRF focusing on "research niche areas", providing universities with the opportunity to develop some of their focus areas according to IRDP criteria and submit them to NRD for consideration.

ISI: Institute for Scientific Information.

JNGS: Journal for New Generation Sciences – the CUT's own inter-disciplinary accredited journal.

Journal: A journal is a peer-reviewed periodical publication devoted to dissemination of original research and new developments within specific disciplines, sub-disciplines and fields of study. These include original articles, research letters, research papers and review articles. Only articles in approved scholarly journals are subsidised by DHET. Only complete, peer reviewed articles in journals are accepted for subsidy. The DHET maintains a list of South African journals that meet the criteria set out in their policy-(obtainable from DHET website.)

Montreal Statement: The Montreal Statement builds on the Singapore Statement, issued after the 2nd World Conference, which was the first international effort to set out common principles and responsibilities for research integrity. The Statement highlights four main areas: a) General Collaborative Responsibilities, b) Responsibilities in Managing the Collaboration, c) Responsibilities in Collaborative Relationships, and d) Responsibilities for Outcomes of Research.

NACI: National Advisory Council on Innovation.

NQF: The National Qualifications Framework has ten levels. Higher education qualifications occupy six levels of the NQF, namely levels 5 to 10. Levels 5 to 7 comprise undergraduate qualifications (with exception of the professional Bachelor's degree at Level 8) and levels 8 to 10 accommodate postgraduate qualifications. Each NQF level has a level descriptor. Level descriptors provide guidelines for differentiating the varying levels of complexity of qualification on the framework.

NRDS: National Research and Development Strategy.

NRF/RISA: National Research Foundation – South Africa's national agency for promoting and supporting research across all fields with the mission to contribute to the knowledge economy in SA attaining at least 2% of global research and development output by 2015. The NRF has a rating system of individual researchers with a high level of credibility which is directly linked to funding of individual researchers. RISA: Research and Innovation Support and Advancement is a process initiated by the NRF towards making interaction with the NRF more user-friendly, with a renewed focus on serving stakeholders and developing stronger partnerships with the NRF's clients.

OECD: Organisation for Economic Cooperation and Development.

Organisational culture: Most definitions concede that human culture is a "shared system of meanings". Organisational culture is therefore the system of shared beliefs in an organisational context.

Part time student: Any person enrolled as a student at the CUT, while also holding a position at a place of work in terms of the Labour Relations Act (Act 66 of 1995), is considered to be a part time student, while any other student is considered to be full time.

PDTs: Product Development Technology Station.

Peer review: Peer evaluation of research is a fundamental prerequisite of all recognised outputs and is the mechanism of ensuring and enhancing quality.

Plagiarism: Plagiarism is the act of claiming or insinuating ownership of another person's intellectual and/or academic contribution: this is a specific and very serious form of academic misconduct. Among other things, plagiarism includes:

- word-for-word copying of sentences or whole paragraphs from one or more sources (the work or data of other persons), or presenting of substantial extracts from books, articles, theses, other unpublished work such as working papers, seminar and conference papers, internal reports, lecture notes or tapes, without clearly indicating their origin or source. Such work should be referenced appropriately;
- paraphrasing of sentences or whole paragraphs from one or more sources (the work or data of other persons), or presenting of substantial extracts from books, articles, theses, other unpublished work such as working papers, seminar and conference papers, internal reports, lecture notes or tapes, without clearly indicating their origin or source;
- submitting another student's work in whole or in part;
- using of another person's ideas, work or research data without acknowledgement;
- submitting work which has been written by someone else on the student's behalf;
- copying computer files, algorithms or computer codes without clearly indicating their origin; and
- submitting work which has been derived, in whole or in part, from another person's work by a process of mechanical, digital or other transformation (e.g. changing variable names in computer programs).
- Also consult with the CUT *Student Assessment Manual*

Postgraduate supervision: Teaching and learning at the postgraduate level should be driven from the perspective that the supervisor plays a supportive role in the student's discovery of new scientific knowledge. The supportive role should be informed by assisting the student to delineate the research topic, to formulate appropriate research questions, to identify an appropriate research design and to develop the scientific and scholarly skills of the student. The supportive role implies that the different roles and responsibilities are well-defined. This relationship depends on mutual commitment to the project and assignment, clear roles and responsibilities in the supervisory relationship and regular interaction on the basis of formative assessment.

Proceedings: Proceedings refers to a published record of a conference, congress, symposium or other meeting where the purpose is to disseminate original research and new developments within specific disciplines, sub-disciplines and fields of study. Approved conference proceedings are those which appear in approved journal lists or other approved indices or those which meet the criteria laid out in the DHET policy.

Programme: According to HEQF a programme is a purposeful and structured set of learning experiences that leads to a qualification. Programmes may be discipline-based, career-focused, trans-, inter- or multi-disciplinary of nature. A programme has a recognised entry and exit point.

Qualitative research: A method of inquiry employed in many different academic disciplines, traditionally in the social sciences, but also in market research and further contexts. Qualitative researchers aim to gather an in-depth understanding of human behaviour and the reasons that govern such behaviour. The qualitative method investigates the *why* and *how* of decision making, not just *what, where, when*. Hence, smaller but focused samples are more often needed than large samples. In the conventional view, qualitative methods produce information only on the particular cases studied, and any more general conclusions are only propositions (informed assertions). Quantitative methods can then be used to seek empirical support for such research hypotheses (Wikipedia).

Quantitative research: This is the systematic empirical investigation of social phenomena via statistical, mathematical or computational techniques. The objective of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships. Quantitative data is any data that is in numerical form such as statistics, percentages, etc. In layman's terms, this means that the quantitative researcher asks a specific, narrow question and collects a sample of numerical data from participants to answer the question. The researcher analyses the data with the help of statistics. The researcher is hoping that the numbers will yield an unbiased result that can be generalised to some larger population. Qualitative research, on the other hand, asks broad questions and collects word data from participants. The researcher looks for themes and describes the information in themes and patterns exclusive to that set of participants (Wikipedia).

RAPDASA: Rapid Product Development Association of South Africa.

R&D: Research and development.

RNA: Research niche area, for example, an RNA for the CUT is Integrated Product Development.

Research clusters and programmes of the CUT: Programmes at CUT were integrated into three research clusters, namely: Industrial Design, Communication and Development; Quality of Health & Living; and People & Skills Development. Each cluster has several programmes.

Research cycle: The process of taking the research problem through various academic stages (such as enrolment for postgraduate qualifications, publication writing, conference papers, supervision) to the process of patenting (intellectual property), commercialisation (spin-in to business and industry and towards third stream income) and eventually production (spin-out and sustained third stream income). The full cycle is completed when research and innovation are used as a platform for engagement with and for implementation with communities, society, business, industry and government.

Research integrity: Public trust and confidence in research. The most known conditions for research integrity are: do no harm to people; no plagiarism; no falsification of information; no fabrication of information; informed consent; and data security.

Research management: This refers to the function of managing the research activities of the university for the purpose of creating new knowledge and the application of that knowledge for societal and commercial use. Research management is conceptualised within four quadrants: a) steering the process, b) identifying resources, c) impacting environmental factors (such as policies and strategies), and d) in the service of social communities, including business, government and industry (e.g. to improve quality of life and quality to end-users).

SANReN: South African National Research Network is a project to create a new National Research and Education Network in South Africa, providing its clients with both connectivity to the world's research networks and commodity Internet access.

SAQA: The South African Qualifications Authority is responsible for the development of policy and criteria for registering standards and qualifications on the NQF (National Qualifications Framework) and the CHE (Council for Higher Education).

SARChI: South African Research Chairs Initiative by NRF/RISA. See also Centre of Excellence (CoE).

SARIMA: Southern African Research and Innovation Management Association. SARIMA operates at an institutional, national and international level, as well as across the research and innovation value chain, from research management to intellectual property management and the commercialisation of research outputs. SARIMA interacts, liaises and forms strategic alliances and partnerships with other organisations as required.

Scholarship: Scholarship is noted by its significance to its particular profession, is creative, can be documented, can be replicated or elaborated, and can be and is peer-reviewed through various methods. The historical method comprises the techniques and guidelines by which historians use primary sources and other evidence to research and then to write history. The question of the nature, and indeed the possibility, of sound historical method is raised in the philosophy of history, as a question of epistemology. The empirical method is generally taken to mean the collection of data on which to base a hypothesis or derive a conclusion in science. The empirical method is not sharply defined and is often contrasted with the precision of experiments, where data is derived from the systematic manipulation of variables. The experimental method investigates causal relationships among variables. The scientific method refers to a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. To be termed scientific, a method of inquiry must be based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning. A scientific method consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses (Wikipedia).

SETA: Sector Education and Training Authority. Recognising the dire need to improve skills development, the South African Parliament ratified the Skills Development Act in 1998, which defined a new Sector Training and Education Authority (SETA) system. In essence, the plan was to develop a series of sector skills plans within a clearly defined framework of the National Skills Development Strategy.

SET: Science, Engineering and Technology.

STEPS: Strategic Transformation of Educational Programmes and Structures at the CUT. As part of the STEPS process, research methodologies and practices have been developed that are multi-, inter- and trans- disciplinary in nature.

STEM: Science, Technology, Engineering and Mathematics.

Summative assessment: This is conducted on all the set learning outcomes of a course/module and is administered by the Assessment and Graduation Unit during June and November each year under the jurisdiction of Senate. It is an assessment opportunity assessing all or broad sections of the learning outcome identified for the course/module. It is the final assessment of the Master's or Doctoral study.

Supervisor: Is the person appointed, under whose academic direction and guidance a student completes studies. The co-supervisor is appointed to assist the promoter in discharging his/her responsibilities as supervisor.

Thesis: The research report submitted in the prescribed format and in fulfilment of the curriculum of a doctorate. The thesis is a formal document whose sole purpose is to prove that the student has made an original contribution to knowledge.

Triangulation: A combination of qualitative and quantitative research. Triangulation is a powerful technique that facilitates validation of data through cross-verification from more than two sources. In particular, it refers to the application and combination of several research methodologies in the study of the same phenomenon. It can be employed in both quantitative (validation) and qualitative (inquiry) studies. It is a method-appropriate strategy of founding the credibility of qualitative analyses. It becomes an alternative to traditional criteria like reliability and validity. It is the preferred line in the social sciences. By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single method, single-observer and single-theory studies (Wikipedia).

URIC: University Research and Innovation Committee at the CUT as a committee of SENATE with certain approval and reporting delegations.

WIL: Work-integrated learning. Some qualifications will be designed to integrate theory and practice through the incorporation of WIL into the curriculum. WIL is characteristic of vocational and professionally- oriented qualifications, and may be incorporated into programmes at all levels of the HEQSF. WIL may take various forms including simulated learning, work-directed theoretical learning, problem-based learning, project-based learning and workplace-based learning.

Research Development and Postgraduate Studies

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The purpose of this manual is to assist and guide researchers and postgraduate students by means of good practices associated with the research process at the Central University of Technology.

This manual should provide support to researchers and postgraduate students in doing their research. This manual does not pretend to provide all the answers, but rather attempts to direct researchers to where the supportive material can be found, and to show the researchers how this material can assist them to accomplish their research.

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