



Central University of
Technology, Free State



9

June 2014

COMMUNITY ENGAGEMENT AT CUT



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OVERVIEW

Central University of Technology, Free State (CUT) acknowledges the important role of the third mission of universities, namely Community Engagement. Community Engagement is commonly known as the active interaction between the university and its communities. The basis of this interaction is the university's expert knowledge, practice and innovation.

At CUT this mission is driven through three key values:

- Community Engagement must be rolled out via the curriculum - both at undergraduate and postgraduate level and innovation and incubation programmes;
- Service Learning and Work-integrated Learning are powerful curriculum strategies to deliver on community engagement;
- Community Engagement projects should be rolled out via a quadruple helix approach (university/business industry/government) to enrich application opportunities and to benefit social communities (as end users in this model).

These key values are informed by a draft CUT Community Engagement policy, philosophy and strategy that are currently being discussed by the University's community. CUT's Community Engagement framework is based on the University's Vision 2020 statement.

This brochure reflects on CUT's community engagement projects for 2014. Since Community Engagement activities are ongoing, dynamic in contents and shaped according to available needs and expertise, the agenda on community engagement can never be closed.

We invite you to be part of this exciting CUT mission driver!

Professor Laetus O K Lategan

Dean: Research and Innovation

Community Engagement at CUT

BRIEF ON COMMUNITY ENGAGEMENT STRATEGY

CUT's focus continues to be on socio-economic development, innovation, development and transformation. Important aspects of Community Engagement are the National Development Plan, The Post School White Paper 2013 and its guiding documents, as well as the sustainability of projects in this regard.

The new National Development Plan reinforces the notion of socio-economic development and innovation, improved education, skills development, job creation, and a better society overall. Community Engagement strives to meet these goals via various modes of service delivery that occur through the curriculum at undergraduate and postgraduate levels. Learning occurs through work-integrated learning, service learning and classroom teaching, but this engagement would not be effective without the co-operation of our quad helix partners, namely business, government and industry, with the community as the end user.

The model of CE encapsulates how CE functions at CUT. It is executed through the following foci areas:

- Eradicating poverty and related conditions
- Promoting human dignity and health
- Increasing social capacity
- Development
- Education
- Balancing a sustainable environment with a competitive industry

The modes of delivering on these foci areas are divided into the following programmes: Teaching, Training, Research, Skills Development and Professional Development. Sustainable Development, Innovation, Incubation and Entrepreneurship form the overarching goals of CE.

The learning process of Community Engagement is necessary for human capital development and the knowledge economy. CE is something that can be considered as a lifelong and life wide process which enables students to become citizens that are better equipped to face the world. Of great significance is the engagement process. The understanding and the

capacities of the students in a global setting enable and equip them for action and proper transformation as a good citizen.

Mrs Jeeva Munsamy

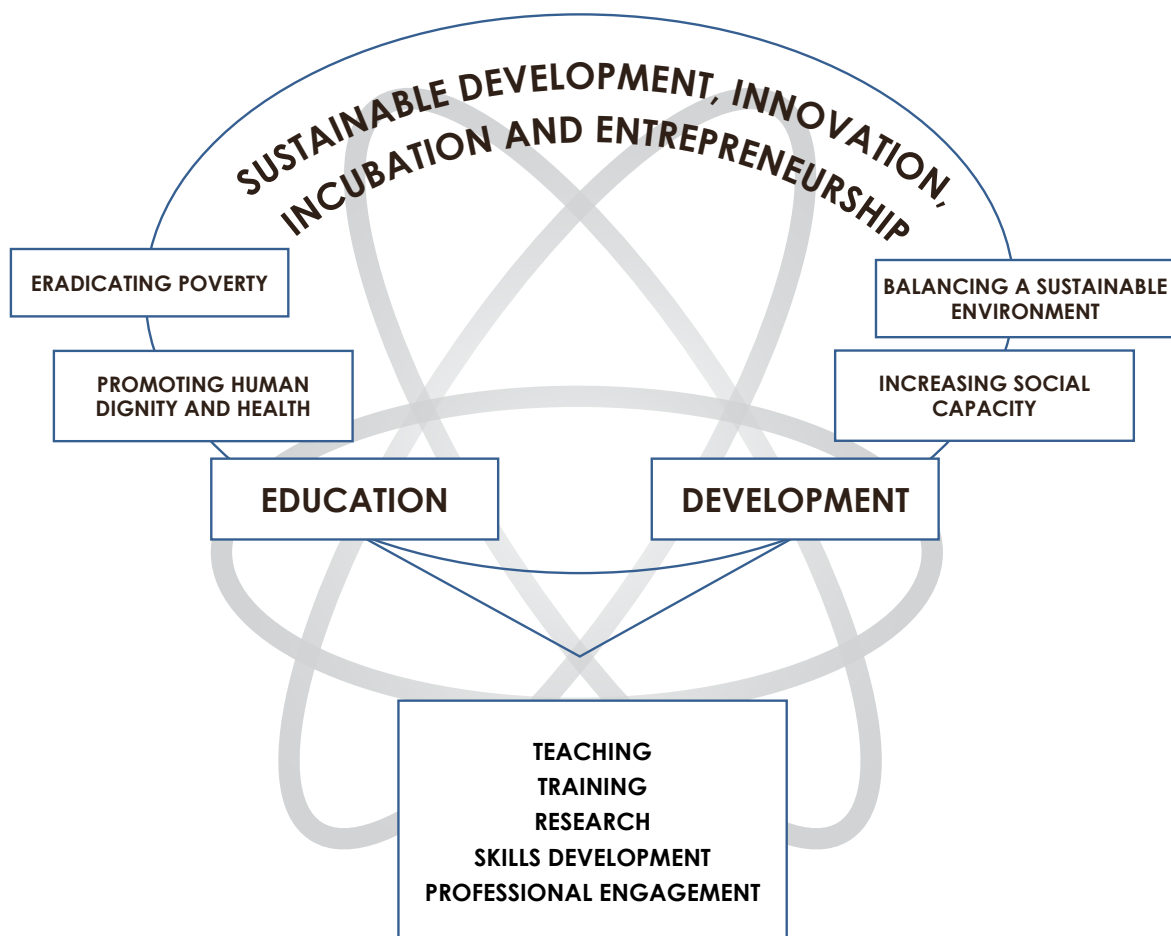
Community Engagement Manager

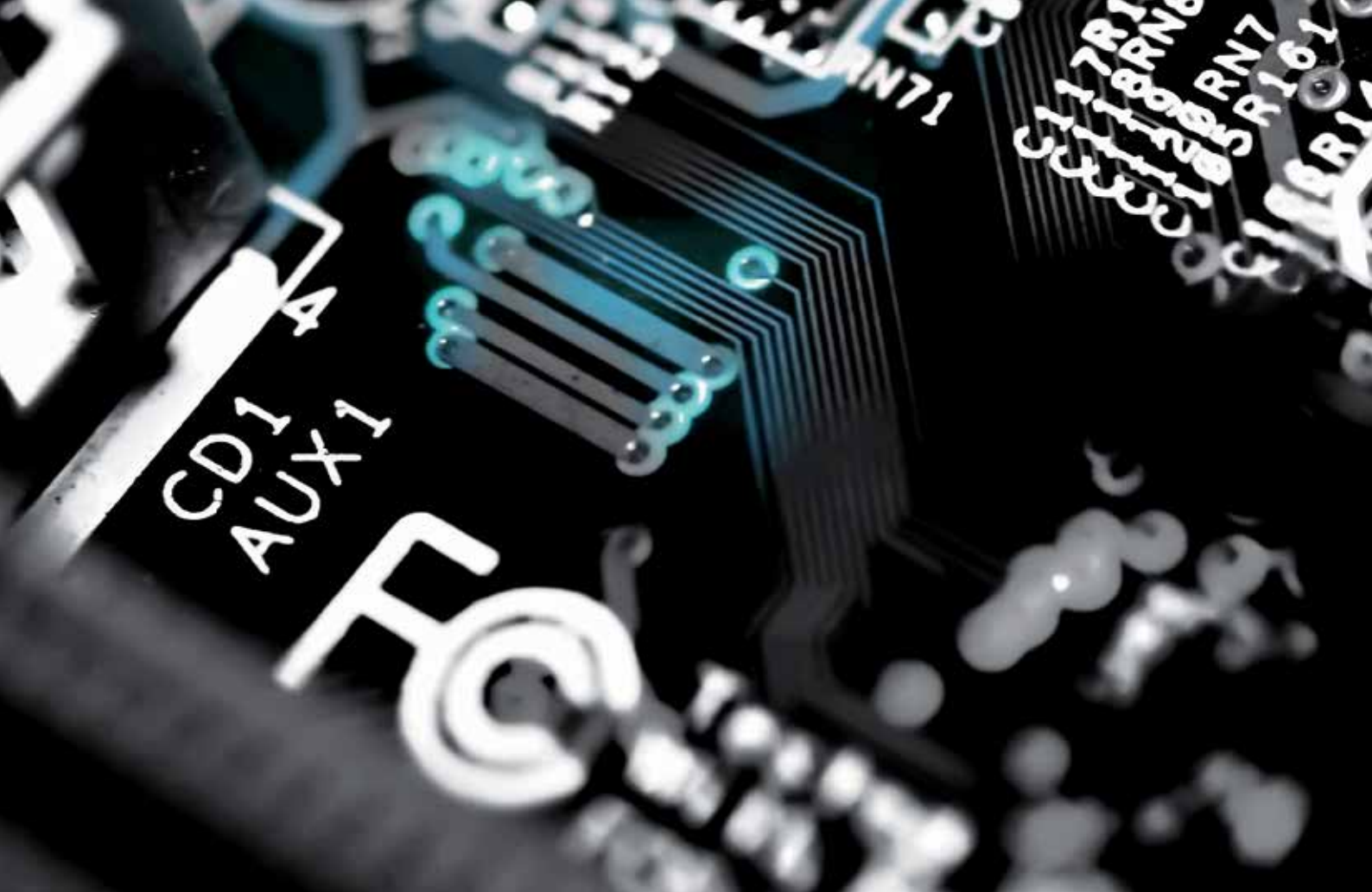
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MODEL OF CE AT CUT





FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

ANNUAL CAREER SCHOOL PROJECT

The Annual Career Winter School is a Faculty-specific programme with Engineering-related information provided to Grade 10 to 12 learners over three days during the June recess. Learners from different secondary schools in the Free State, Northern and Eastern Cape participate in this Winter School project. The purpose of the school is to have more informed learners with regard to admission requirements and content of different engineering programmes, and to have potential students more focused on choice of career.

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COMPUTER BUILDING

In this module, the emphasis is on the hardware aspect of a personal computer in view of enhancing curricula-based learning and teaching skills for entrepreneurial development. With CUT as the partner and first-semester students as our community, foci areas include:

- Developing skills and enhancing achievement;
- Establishing entrepreneurial skills;
- Serving as a practical demonstration of the curriculum; and
- Serving as a practical example of what is expected in a job environment.

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CISCO TRAINING

Networking classes are presented to industry employees to improve their networking knowledge and skills. This training improves the networking skills of employees in the industry. Networking skills like routing and switching are added, and work on real equipment. Extra skills in basic configuration, routing, switching and wide area network (WAN) are added. These skills enable people to apply for better positions and for further study.

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CONTRACTOR INCUBATOR PROGRAMME

This project takes place with thirty contractors in conjunction with the National Department of Public works. The project focuses on the following:

- Programmes relating to business analysis (business planning).
- The development of an IT toolkit for improved site efficiency and productivity.

Internal staff participants involved in this project are from the different departments of the Faculty.

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DUTCH REFORMED CHURCH – KLIPKERK

Basic computer literacy training in Microsoft Word, Microsoft PowerPoint and Microsoft Excel is given to about 25+ participants from the community. The participants included employed as well as unemployed individuals. Classes are conducted throughout the week either during the mornings (9h00-12h00) or afternoons (17h00 – 18h00) at the computer laboratory of the church.

Project leaders: Mr S Viljoen, Mr P Potgieter, Mr N Raboqhwa, Ms W Kuyler and Dr A Van Der Linde

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CONTRACTOR DEVELOPMENT PROGRAMME (CCCTRaining)

Construction Management skills are offered to emerging, small-and medium-size construction enterprises. Internal staff participants involved in this project are from the different departments of the Faculty. The external partner is the Department of Police, Roads and Transport, Free State. This project works with 107 learner contractors.

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FACULTY OF HEALTH AND ENVIRONMENTAL SCIENCES

SERVICE LEARNING IN THE SCHOOL OF HEALTH TECHNOLOGY

Radiography - Medical Imaging and Radiation Protection

Third year Radiography students are involved in service learning at several high schools in the Bloemfontein area. The purpose of these visits is dissemination of information on the availability of medical imaging services in the region, and information on breast cancer, pregnancy, bone diseases, mammography, obstetric ultrasound and bone densitometry and the manner in which examinations are performed. Preventative education is provided for cancer, maternal and fetal well-being, teenage pregnancy and osteoporosis.

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DENTAL ASSISTING

The students are working with external and internal communities, such as crèches, pre-primary schools and CUT. Oral-health education is provided to pre-primary children, their parents and their caregivers. Part-time students work in dental practices all over the country. Oral hygiene students offer education and dental screenings as part of their service learning module, and celebrate Oral Health Month during September of each year. In addition, they also offer their services to students and staff of CUT during September.

Project leader: Dr DM Mtyongwe

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SOMATOLOGY

Students were requested to contact salons, organise and teach shampooers the skill of shampooing ladies' hair. In addition, Indian head massage; scalp massage; neck and shoulder massage; and hand massage were taught. Students were requested to keep record of their services, and to submit a complete portfolio, providing evidence of their project. Very positive feedback was received.

Project leader: Ms M Vosloo and Ms J Jonker

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HEALTH AND AWARENESS: HEALTH-RELATED ASPECTS

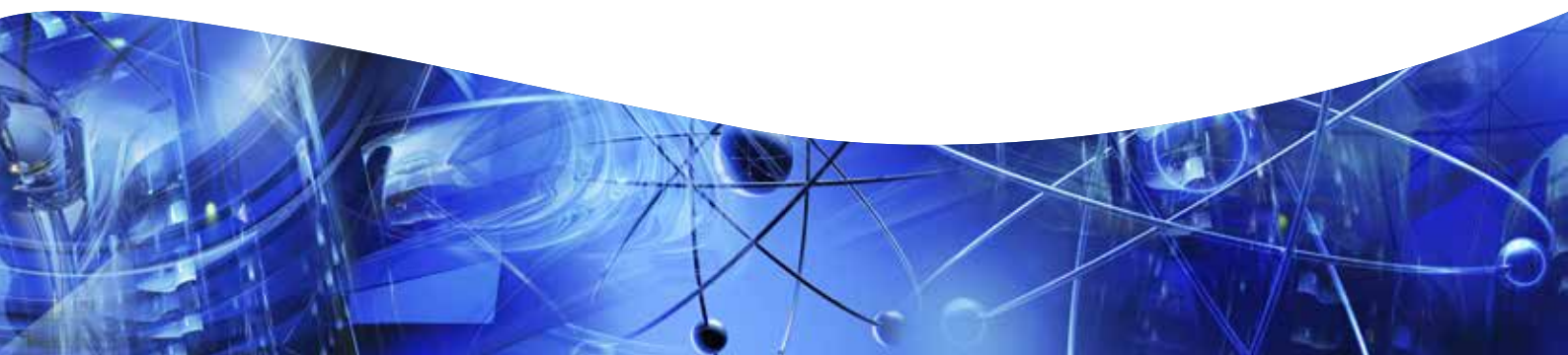
This is a service learning project that focuses on high school learners and a prison. Drug/ substance abuse is rife in many of these areas. This project focuses on educating learners and inmates on the effects of drugs on their health.

Project Leader: Mr P Makhoahle

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Faculty of Health and Environmental Sciences: 051 5073112



“WHEELS OF HOPE” OUTREACH PROJECT

The Wheels of Hope project was initiated by the Department of Cardiothoracic Surgery at the University of the Free State, with the focus on diagnostic and treatment aspects of heart and lung conditions, as well as a training and education programme. The project aims to determine the prevalence of rheumatic heart disease amongst learners in grades 10 to 12 at schools in Bloemfontein, Welkom, Bethlehem and Kimberley.

Project Leader: Dr L Botes

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Faculty of Health and Environmental Sciences: 051 507 3112

LIFE SCIENCES STUDENTS ORGANISATION (LISSO)

LISSO's membership is extended to students studying in the field of Health Technology at CUT. This organisation focuses on hygiene-related issues. The strategy is on empowering communities through education. Topics of discussion are; environmental hygiene, cleaning campaigns, anti-littering, household hygiene, etc.

Project Leader: Mr R T Phekonyane

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Faculty of Health and Environmental Sciences: 051 507 3112





FACULTY OF HUMANITIES

SEWING TECHNOLOGY AND CRAFTS

This is a service learning project whereby senior students of the Department of Clothing and Fashion train unemployed women from Bloemfontein in all aspects of sewing and craft making. The training takes place under the supervision of a lecturer of the Department of Clothing and Fashion.

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FACULTY OF MANAGEMENT SCIENCES

NATIONAL SCHOOL OF GOVERNEMENT EXECUTIVE DEVELOPMENT PROGRAMME (EDP)

The Department of Government Management is a partner in all of the three consortia involved in the presentation of the Executive Development Programme (EDP) in different centres in South Africa since 2009. The EDP is one of the high-profile management development programmes of the Presidential Strategic Leadership Portfolio (PSLDP), targeting, for instance, new and aspiring directors and chief directors in the South African public sector. The three consortia are the North-West University, Vaal University of Technology and Nelson Mandela Metropolitan University. Other individual members of the various consortia include the University of Johannesburg, Witwatersrand University, and University of the Free State, Durban University of Technology and University of Kwa- Zulu Natal

Project Leaders: Professor T Van Niekerk and Dr CD Olivier

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ESKOM B. TECH PROJECT MANAGENT AND M. TECH BUSINESS ADMINISTRATION

CUT is offering the M Tech: Business Administration to selected employees of ESKOM who have successfully completed the BTech Project Management Programme. The programme runs over 3 years of part-time study. and the B Tech Project Management to selected employees of ESKOM. The programme runs over 2 years of part-time study

The Centre operates within the broader mission of the CUT, as well as the mission of the Faculty of Management Sciences:

- Fostering, developing and enhancing the entrepreneurial and business spirit amongst the community.
- Developing, promoting and expanding market-related knowledge amongst potential entrepreneurs, entrepreneurs, business professionals and educators regarding:
 - The role and importance of small-, medium- and micro-sized enterprises in the economic development of South Africa; entrepreneurship and intrapreneurship as career opportunities; and multi-skilling as a competitive edge in the modern business.

Project Leader: Professor DY Dzansi

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E-mail: ddzansi@cut.ac.za

Faculty of Management Sciences: 051 5073220

CENTLEC M. TECH BUSINESS ADMINISTRATION

CUT is offering the M Tech: Business Administration to selected employees of CENTLEC who have successfully completed the BTech Project Management Programme in 2011/2/3. The programme runs over 3 years of part-time study.

Project Leader: Professor DY Dzansi

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STRONGBOW PROJECT

This project is aimed at building capacity within the higher education sector in Ethiopia, particularly in the fields of tourism, eco-tourism and natural resources management. In partnership with Horn of Africa Regional Environmental Centre and Network (HoAREC) in Ethiopia, training is provided by means of workshops, as well as educational and site visits.

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ENACTUS/ RECYCLING PROJECT

In preparing university students to make a meaningful contribution towards a better world as entrepreneurs and business leaders, ENACTUS challenges students to address real world economic, social and environmental issues in their communities. As catalyst for the development of leaders who will create a better world through business, ENACTUS provides students with the most relevant and rewarding opportunity to use their leadership abilities to improve the world we live in.

2013/2014 ENACTUS CUT is embarking on three main projects:

- Local Economic Development Project in Welkom, Thabong Industrial Areas (Sponsored by Harmony) – This project involves the development of a model SMME hub in Thabong Township in Welkom
- The Crafts Project In collaboration with KidzCare, Bloemfontein This involves capacitating street kids below 18 with skills, knowledge and competencies to enable them to lead a normal life

The Bakery Project in Thaba Nchu – This project aims at resuscitating a defunct bakery of a woman in Thaba Nchu

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Faculty of Management Sciences: 051 5073220

PROMOTION OF TOURISM: SOUTH AFRICAN COLLEGE FOR TOURISM (SACT) PROJECT

The aim of this project is to provide a service to SACT in Graaff-Reinet by means of academic management and the moderating of the theoretical and practical components of the subjects Culinary Studies, Food and Beverage Studies, Housekeeping, and Front Office. In this way, excellent quality standards are maintained in the hospitality training provided to 90 deserving young women from SADC member countries, primarily for employment in the various transfrontier parks.

Project Leader: Ms MA Muller

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MACCAUVLEI LEARNING ACADEMY PARTNERSHIP (MLA)

From 2012, Maccauvlei Learning Academy has been in partnership with the CUT to offer BTech Human Resources Management programme to qualified delegates. Since then 132 delegates have enrolled and 120 have graduated. From these 120 delegates, 15 have graduated cum laude. This includes group 3, which graduated in March 2014.

The fourth intake with 55 successful applicants commenced in March 2014. MLA and CUT has also signed a Memorandum of agreement that commits this partnership for the next three years.

Project Leader: Professor MN Naong

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Faculty of Management Sciences: 051 507 3220

COURSE IN ACCOUNTING TECHNICIANS (CERTIFICATE AND FET ADVANCED)

CUT, in partnership with the Association of Accounting Technicians (AAT), provides learners with basic to complex finance and accounting skills. This partnership addresses the accounting scarce-skill shortage. AAT (SA) offers a practical qualification targeted at all staff levels, from administration to professional accounting positions. The focus of the AAT certificate and FET advanced certificate is to address business needs in terms of basic finance and bookkeeping. Candidates are empowered to perform basic finance and accounting functions.

Project Leader: Ms E Laurence

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E-mail: elaurance@cut.ac.za

Faculty of Management Sciences: 051 507 3220

SERVICE LEARNING IN RESTAURANT SERVICE

This is a service learning project in which senior students of CUT's Hotel School train learners from selected schools (namely Petunia High School, Navalsig High School, Heatherdale High School, Petunia High School in Branford, Staatspresident Swart High School in Bloemfontein, and Hendrick Potgieter High School in Reddersburg) in all aspects of "waitering" (restaurant service). The training takes place under the supervision of a lecturer of the Hotel School. Learners are trained in all aspects of restaurant service, and are empowered to work as part-time waiters.

The module has motivated some learners to enroll for the National Diploma in Hospitality Management. In partnership with Protea Hotels, selected learners who successfully completed the module in restaurant service are provided with the opportunity to participate in the Protea Hotels in-house training programme to start their career in the hospitality

industry. This is an amazing opportunity for the learners, as most of them do not have the financial means to study at a higher education institution.

Project Leader: Mr JP Ras

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Faculty of Management Sciences: 051 507 3220

THABISO SKILLS TRAINING CENTRE (IN PARTNERSHIP WITH CUT) - WELKOM CAMPUS

'Thabiso', means happiness or joy in Sotho. The centre's aim is to bring a purpose of self-worth and independence to the large number of unemployed persons in the Goldfields. The project provides skills training for the previously disadvantaged people and to empower them to become self-reliant citizens.

The training is SETA approved and the courses are conducted by trained instructors, moderators and facilitators. The duration of the courses are on an average; four to twelve weeks. Annually over 300 people are trained in the various skills; carpentry; bricklaying, welding, plumbing, computer courses, catering and life skills courses.

Project leader: Mr EMB De Freitas

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TAIWE LEARNING CENTRE – WELKOM CAMPUS

The project is conducted at Taiwe High School in Theunissen whereby three schools; Taiwe, Concordia and Academia participate. The project aims at improving the matriculants pass rate in all subjects including Accounting.

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CUT: SCHOOLS ADVANCEMENT ACADEMY (SAA)

SATURDAY SCHOOL PROJECTS AT BLOEMFONTEIN CAMPUS

As part of CUT's Schools Advancement Academy, we provide supplementary tuition to grade 11 and 12 learners on Saturdays. The main objectives of the project are to:

- Provide content, study skills and examination preparation support in Mathematics (Algebra and Geometry separately); Physical Sciences (Physics and Chemistry separately); Life Sciences; and English.
- Improve learners' grades in the above-mentioned subjects.
- Enhance learners' chances of enrolment to Science, Engineering and Technology (SET)-related fields of study.
- Enhance learners' chances for admission to more reputable institutions of higher education that otherwise would not have been possible.
- Extra tuition was offered in the following subjects:
 - Grade 11: English, Mathematics (Algebra and Geometry offered separately); Life Sciences; and Physical Sciences (Physics and Chemistry offered separately).
 - Grade 12: English; Mathematics (Algebra and Geometry offered separately); Life Sciences; and Physical Sciences (Physics and Chemistry offered separately).
- The following has been achieved through the Saturday School project:
 - Learners are better prepared and have better grades for admission to Science, Technology, Engineering and Mathematics (STEM)-related courses at higher education institutions.
 - Learners are exposed to Engineering-related courses at CUT.
 - A significant number of the learners who has participated in the Saturday School project are currently enrolled for SET-related courses at CUT and other higher education institutions in South Africa, and several are making a success of their studies.

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Project Leader: Mr BW Jeremiah (Bloemfontein Campus)

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EDUCATOR MENTORSHIP DEVELOPMENT PROGRAMME (EMDP)

CUT's Schools Advancement Academy, in partnership with the Telkom Foundation and the Free State Department of Education are engaged in a developmental project. This project is aimed at addressing the skills shortage among primary school educators in the specific areas of Science, Technology, English and Mathematics (STEM). The focus is on foundation and intermediate phase education, with the intention being to develop, empower and mentor educators in the required skills.

The pilot project – initiated at three schools in the Mangaung area, namely Grassland Primary School, Bainsvlei Combined School, and Kamohelo Primary School grew into its mature stages towards the end of 2013. Further initiatives were undertaken to roll out an ICT intervention to these schools as from 2014. Three new schools had been identified for mentorship during 2014 and 2015.

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Project Leader: Mr BW Jeremiah

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ANNUAL WINTER SCHOOL

As part of CUT's Schools Advancement Academy, an annual Winter School is presented by its School of Teacher Education. The beneficiaries for this Project are Grade 12 learners. The purpose of the Winter School Project is to assist these learners with the preparation for their final examination. The following subjects are offered in the Winter School Project in both English and Afrikaans:

Mathematics, Physical Sciences, Life Sciences, Geography, Accounting, Economics, Business Studies, Engineering Graphics and Design.

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Project Leader: Ms J Bihi

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ANNUAL SPRING SCHOOL

The purpose of the project is to assist grade 12 learners with the preparation for their final examinations. Delivery of content is done through a form of revision, moreover to supplement what had been taught during the Winter School and further enhance learners' knowledge in the following subjects: Mathematics, Physical Sciences, Life Sciences, Geography, Accounting, Economics, Business Studies, Engineering Graphics and Design.

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INNOVATION

INNOVATION ACTIVITIES

Most innovation activities currently take place through the Product Development Technology Station (PDTs). However, the recent establishment of an Innovation Fund is noteworthy. This initiative will regulate the manner in which academics and graduating postgraduate students can access funds for the innovation and commercialisation activities normally required to convert research outputs that represent new intellectual property into a commercial product. CUT management allocated strategic funds for this purpose. This initiative is managed operationally by the Office of Technology and Innovation.

INCUBATION ACTIVITIES

CUT has a relatively small incubator, consisting of nine individual working spaces. These are rented out to new start-ups preferably developing high-technology devices. The maximum incubation period is normally limited to three years, during which time those companies occupying incubation space are expected to establish their businesses in a protected environment and attend short courses in business development, offered by a suitably qualified member of CUT staff. Business entities participating in the incubator occupy furnished premises, and those that meet certain predefined criteria qualify for the subsidisation of their telephone, internet and stationery expenses, whilst photocopying services up to a specified maximum number of copies per month are provided free of charge.



ASSISTIVE DEVICES TO IMPROVE LIFE FOR PERSONS WITH DISABILITIES OR RHEUMATOID ARTHRITIS AND OTHER DISEASES

People with disabilities are among the poorest and the most vulnerable in society. They are often denied access to education and training, which in turn results in a lack of skills necessary for employment. An assistive device opens doors to learning, employment and social participation. There is a tendency to view people with disabilities as a homogeneous group, all requiring the same kind of intervention and the same type of device. The reality is that people with disabilities are as diverse as society itself, with each individual having his or her own unique contributions to make and needs to be met.

Currently most of the assistive devices in South Africa are imported and expensive and therefore unaffordable for provincial hospitals. As a result, such hospitals are forced to attempt to manufacture their own devices from the available materials. These devices are not patient specific, however, and not suited to the needs of all patients.

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Technology and Innovation: Centre for Rapid Prototyping and Manufacturing

PRODUCTION OF PRE-OPERATIVE MODELS THROUGH ADDITIVE MANUFACTURING

Reconstructive surgery involves the repair of an injured or deformed part of the body through surgical procedures. Each reconstruction is patient-specific and requires a unique clinical approach. The final outcome of reconstructive surgery is largely dependent on the surgeon's ability to plan. The better the surgeon is at planning and simulating the procedure, the easier it becomes to approach the surgery with confidence and to avoid mistakes or complications. Currently, surgeons make use of aids like radiographic film, computer tomography (CT) scanning and magnetic resonance imaging (MRI) to visualise the planned procedure and to guide them through it. However, the use of these aids is limited where complicated procedures are required.



Previous research has shown that AM can be a very useful tool in the planning of surgical procedures. A model of the anatomical feature where surgery is required can be produced in a medium such as nylon polyamide from the CT data of the patient.

Having a pre-operative model of the patient considerably shortens the duration of surgery. This benefits the patient by reducing the risk of complications such as infections and excessive blood loss during prolonged surgery. Other advantages include lower costs for the patient and reduced fatigue for the surgeon.

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Technology and Innovation: Centre for Rapid Prototyping and Manufacturing





SUSTAINABLE DEVELOPMENT

SUSTAINABLE AGRICULTURAL DEVELOPMENT PROGRAMME

There is a dire need for the introduction and enhancement of technical levels of production, as well as highly skilled agricultural experts and sustainable agricultural development. A combination of structured, continuous training in technical aspects and an improved level of education is a means to attain the goal of sustainable socio-economic development. The objective is thus to ensure food security via agricultural production, along with a sustainable livelihood for these farmers, by ensuring a reasonable level of profitability from activities such as agricultural production and/or agric-processing and/or agric-tourism.

The project impact is highly significant in that historically disadvantaged individuals (HDIs) are converted from developing farmers into commercial farmers, while their socio-economic status is greatly improved. The successful implementation of this project will lead to improved farming sustainability and higher levels of literacy among HDIs, thus creating more jobs and reducing crime.

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School of Agriculture & Environmental Sciences



SOLAR GREENHOUSE SYSTEM FOR LOCAL FOOD PRODUCTION

The solar greenhouse is an environmentally sustainable strategy for urban food production, aimed at providing alternatives to the basic diet while reducing the environmental footprint, cutting transportation costs, enhancing food security/safety, reducing waste, conserving water, protecting rivers, and combating global warming. The solar greenhouse makes use of a solar water heater to combat lower temperatures, thus helping to reduce fossil-fuel emissions that typically result from food production and distribution.

The objective of this project is to develop a commercial-scale solar-heated greenhouse that can be used to produce temperature-sensitive crops throughout the year. The Free State Province, although cold during the winter season, still experiences a good deal of sunshine on winter days, and the heat that is generated by the sun through radiation can be harvested, stored and used as solar power to heat the greenhouse during cold winter nights.

Methods of effectively storing this energy during the day for use at night are currently being investigated, along with techniques to block the sun's rays on hot summer days so as to reduce the heat load on the greenhouse if necessary. Reducing the internal volume to be heated is also seen as a means of conserving energy, while a related investigation involves the development of alternative cooling methods (e.g. dry mist) for application in greenhouses.

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RESEARCH

GENERAL OVERVIEW OF RESEARCH AND DEVELOPMENT ACTIVITIES

RESEARCH AND DEVELOPMENT PLAN 2014-2020

The objective of the Research and Innovation portfolio is to support Faculties in their Research and Innovation projects. The focus is on academic staff, postgraduate students and postdoctoral fellows.

The overall-emphasis of these plans is on:

- The development of a sustained, relevant and responsive research culture,
- The qualitative and quantitative improvement of research outputs,
- Socio-economic development through research, transfer and innovation and
- The development of strategic research and innovation partners and programmes

The Research and Development Unit performs a number of core activities:

- Implementation of research and development policies.
- General Administration of all research activities and their funding.
- Monitoring and evaluation of research and development activities.
- Annual Report to Senate, Council and DHET on research and development activities.
- Annual submission of research publications to DHET as per DHET policy.

Senate approved a Research and Development Plan 2014-2020. The highlights of the plan are:

Strategies for Research and Development Plan, 2014-2020:

| Focus | Objective | Activity |
|--|---|---|
| Scholarly development through Research and Innovation Training | Scholarly engagement with the research process and research cycle | Staff and Student Development Programmes Programme on postgraduate supervision Programme on scientific writing Programme on Research Ethics and Integrity Annual Faculty Research Seminars Colloquiums and discussion groups |
| Research partnership development | Capacity growth of research projects | Multi-, inter- and transdisciplinary research Joint ventures with national and international universities, research bodies and research councils Joint ventures with Government/business/industry |
| Development of research clusters and programmes | Strengthening of research capacity | Student retention and throughput Publications Conference attendance Patents Rated researchers Research Funding |

TECHNOLOGY AND INNOVATION PLAN 2014-2020

The Technology and Innovation Office's Strategic Plan for the period 2014 to 2020 makes provision for the following activities:

The roll-out of funding opportunities in support of innovation activities for staff and students is continued. This includes the Vision 2020 Innovation and Incubation Programme and the Seed Fund initiatives financed by the Technology Innovation Agency. In addition participants in these activities can also make use of the services of PDS for the design and manufacture of first-generation models of their inventions.

The CUT Incubator Programme has established a second incubator on the Welkom Campus. This is managed by a staff member seconded to Welkom for this purpose.

The Technology and Innovation (T&I) Office is also functioning as the local Technology Transfer Office. Hence it manages the management and statutory registration of Intellectual Property on behalf of CUT and its researchers in accordance with the Intellectual Property Rights from Publicly Financed Research and Development Act (Act No. 51.2008). The T&I also support efforts to establish a Regional Innovation Forum in the Free State. This initiative is financed and overseen by DST.

CRPM, PDTs and the Fablab resort under the T&I Office. This eases the identification and registration of any IP generated by any of these entities, as well as providing access of students to the Fablab to facilitate assistance in the completion of formal, academic projects.

The expectation is that the T&I Office will continue functioning in the same manner as it did in the recent past, whilst efforts are being made to increase its scope of services visibility on and off campus.

CHARACTERISATION OF THE MICROBIAL DIVERSITY IN FOOD INDUSTRY RELATED EFFLUENTS IN THE FREE STATE

Water quality is no longer considered to be the sole obligation of a single authority, but is becoming the responsibility of all levels of the community, including industry, local government as well as individual water users. The food industry is one of the most important sectors among the manufacturing industries. The processes involved in manufacturing food products generally require large amounts of water which contribute to pollution loads discharged into the wastewater system. Despite strict legislation on effluent composition, the enforcement thereof remains problematic emphasizing the necessity for traceable downstream monitoring. Studies using molecular techniques to monitor microbial diversity during wastewater treatment have demonstrated the usefulness of this approach to identify bio-communities that influence the final effluent quality. The potential to benefit from exploring the applicability of the same approach to generate microbial diversity profiles for individual industrial wastewater contributors remains untapped.

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THE KAROO RIVIERA: CROSS-BORDER TOURISM DEVELOPMENT PLAN FOR THE MIDDLE ORANGE RIVER

The middle Orange River system or “Karoo Riviera” incorporates the area ranging from the Gariep Dam to the Vanderkloof Dam. The tourism potential of this area is largely untapped, and due to the wide geographical spread of the Karoo, tourism development is unable to reach its full potential. Development and marketing plans must be addressed at local, district and provincial level, which poses a challenge to tourism managers and policymakers, since co-operation across provincial borders is never easy.

Integrated tourism development as envisaged by local government is inhibited and constrained by demarcated physical boundaries between and within provinces and municipalities in the relevant provinces, thus inhibiting the optimal tourism development of the middle Orange River system. The objective is to develop a cross-border tourism development plan for the Karoo Riviera.

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**CENTRE FOR RAPID PROTOTYPING
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AND PRODUCT DEVELOPMENT
TECHNOLOGY STATION (PDTS)**

ADDITIVE MANUFACTURING SERVICE TO INDUSTRY AND RESEARCHERS

The Centre for Rapid Prototyping and Manufacturing (CRPM) offers state-of-the-art equipment to accelerate the manufacturing of products using a variety of additive manufacturing (AM) techniques, i.e. rapid tooling and rapid manufacturing. This financially self-sustainable activity was established with the assistance of government agencies such as the Technology and Human Resources for Industry Programme (THRIP), the National Research Foundation (NRF) and various industrial partners. These partnerships have played a role in putting the CRPM at the forefront of AM research in South Africa and internationally.

The products delivered by the CRPM serve as prime examples of the efficacy and productivity of the South African manufacturing industry, while simultaneously allowing students – both undergraduate and postgraduate – to engage in work-integrated learning and to gain industrial engineering experience. The CRPM's vast customer base includes local entrepreneurs and international companies, with approximately 500 commercial projects being completed annually. Approximately eight to nine percent of the annual turnover is spent on the production of research models.

The CRPM has a proven ability to produce pre-operative planning devices and medical implants for reconstructive surgery from medical scans of patients with deformities or damage due to accidents or cancerous growths.

The process of producing patient specific titanium implants is a highly specialized field and CRPM has carried out a number of case studies during the past year. This has been done in collaboration with Dr Cules van den Heever, a prosthodontist from the University of Pretoria. He also assists maxillo-facial surgeons as well as ear, nose and throat specialists in manufacturing patient specific implants and external soft tissue prostheses such as ears and noses as well as full facial prostheses. Since his involvement with the CRPM, Dr van den Heever has embraced the possibilities inherent in the AM technologies to the benefit of his patients.

The CRPM has been in discussion with the various role players to establish where and how the CRPM can use its specialized equipment and expertise to provide a better service to the doctors and patients and also play a role in the social upliftment of vulnerable State patients who do not have recourse to medical aid funds for life-changing procedures.

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CASTING OF ART WORKS OF LOCAL ARTIST

PDTS regularly trains local artists to manufacture silicone moulds of their artworks. This enables them to reproduce the original artworks and sell copies of the work and become economically sustainable. The artists worked in different mediums such as steel-filled plastic and other plastics suitable for casting. By doing this, they are encouraged to investigate how they can produce different looks of the artwork they started with.

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MEDICAL DEVICE INNOVATION PLATFORM (MDIP) – DEVELOPMENT OF MEDICAL DEVICES FOR RESEARCH AND COMMERCIAL PURPOSES

The primary aim of the Medical Device Innovation Platform (MDIP) is to develop well-manufactured medical implants and devices for use by clinical practitioners in the treatment of patients, keeping in mind that the success of any medical implant is dependent on the overall condition – medical and otherwise – of the patient in question, as well as the nature of the trauma to which that patient has been exposed.

The Medical Research Council (MRC), local clinical practitioners and external private funding agencies are the community partners in this project, with the MRC acting as facilitator of participating universities. The programme also serves as a funding channel for postgraduate students, especially those from previously disadvantaged groups.

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Technology and Innovation: Centre for Rapid Prototyping and Manufacturing



PDTS SHORT COURSES OFFERED TO STAFF, STUDENTS, AND TECHNICAL STAFF FROM INDUSTRY

COURSE IN PLASTICS

The PDTS offers a short course in Plastics for interested staff and students, as well as technical staff in industry. The course, which is presented by an expert in the field, gives attendees a much better understanding of the processes involved in the manufacturing of plastic products, as well as the various uses for plastic. The knowledge gained during the course can be used to advise medium- and micro-sized enterprises (SMMEs) on the use of plastics, thus serving as a form of community industrial support.

COURSE IN WIRE-CUTTING

Working jointly in a community partnership with Kopaneng Converters (Pty), the PDTS and CRPM offer a Wire-cutting course that teaches participants to operate a wire-cutting machine and cut the necessary parts.

BASIC COURSE IN SOLID WORKS

The PDTS offers a basic course in Solid Works to staff and students, as well as technical staff in industry. The training includes design and drawing techniques using computer-aided design (CAD) in 3D. A person who has completed the course will be equipped with basic skills in Solid Works, as well as the ability to complete projects within a shorter time period.

INTRODUCTION TO SKETCHING AND DRAWING

The PDTS is the community partner in the presentation of this course to staff and students, designed to create a better understanding of the use of sketching in the design process and their subsequent involvement in the development of products. Attendees are taught to translate their concepts into sketches before commencing with CAD.



ADVANCED COURSE IN SOLID WORKS

Working as joint community partners, the PDTS / CRPM present an advanced course in Solid Works, where attendees are trained to work effectively and efficiently in utilising all the available functions. The course allows attendees to improve their design skills using CAD in 3D, and to use CAD more efficiently to complete projects in a shorter period of time.

ADVANCED COURSE IN SKETCHING AND DRAWING – INCLUDING RENDERING FROM CAD

This course is presented by an expert in the field, and teaches attendees to make better use of sketching in the design process. Attendees learn the skill of first sketching their concepts before commencing with CAD.

BASIC COURSE IN FINITE ELEMENT ANALYSIS (FEA)

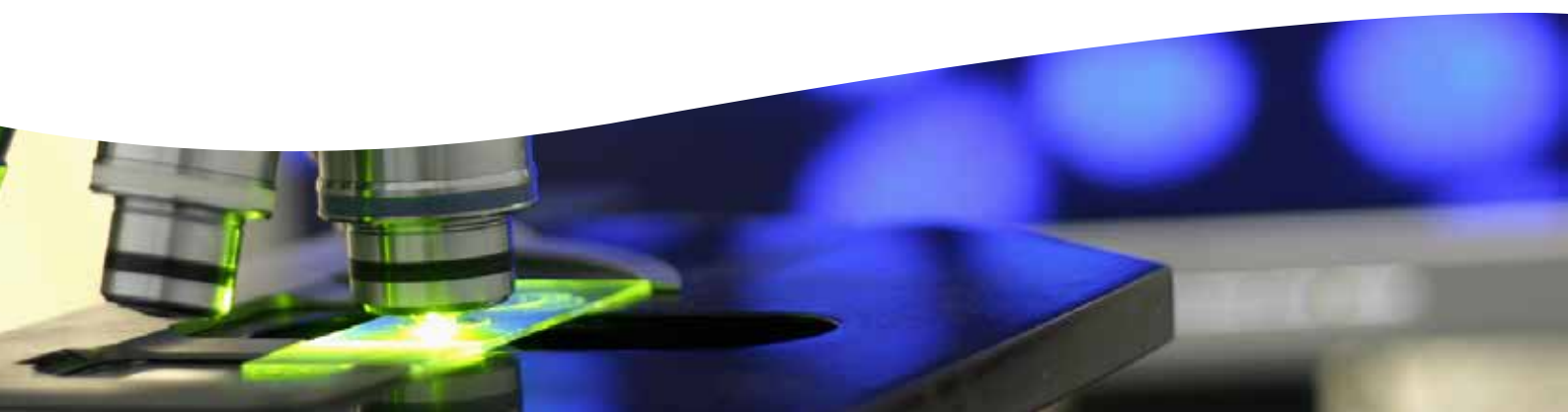
This course, which is presented by an expert in the field as has the PDTS as the community partner, enables attendees to develop a product by means of CAD and then transfer it to the FEA process, thus ensuring sufficient strength of the product.

COURSE IN TOOL DESIGN

This course, which is offered to students, staff and external participants, provides a better understanding of the tool design and manufacturing process. Attendees are then able to make provision for tooling in their own design processes, thus enhancing their final product.

COURSE IN COMPUTER NUMERICAL CONTROL (CNC)

This PDTS-supported course is presented to students, staff and external participants, giving them a better understanding of CNC machines and computer-aided manufacturing (CAM) software. Attendees are taught how to write a CNC program and run it on the machine, and also how to use the machine to cut parts and tools.





EXAMPLES OF SUCCESSES WITH INCUBATION

SOFTWARE DEVELOPMENT AND APPLICATION

A former CUT student, who graduated with a degree in Electrical Engineering in 1991, is now the owner of a leading point-of-sale (POS) business. He first started developing his battery-powered POS system in 1998, and he subsequently joined the CUT Incubation Programme at the Science Park in 2001. The Centre for Rapid Prototyping and Manufacturing (CRPM) provided initial assistance with the development of components for the POS unit, whilst he and his team developed the necessary software. While working with the Incubation Programme, his team received assistance in the form of office/workshop space, as well as administrative, office management and technical assistance from the CRPM.

With over 18 years of programming and retail experience, well-trained employees and innovative product improvements, the company provides top corporate and general retail clients with the very best sales and after-sales service. As a recognized leader in the POS, network support and maintenance service industry, the company sells a wide range of scanners, label printers, slip/receipt printers, cash drawers; touch screens and various other POS-related products. Due to the high demand for stock-control functions in shop security systems, the company also sells a wide range of CCTV and access-control products. With full integration into the POS software, clients can now search for specific transactions on their CCTV recordings.

The company's head office is situated in Bloemfontein, and there are more than 18 branches countrywide – three of which are owned by the business owner himself and employ thirty staff members. With over 9 000 POS packages already sold to small and medium-size businesses nationwide, the company has proven itself to be highly competitive. Thanks to these successes and a comprehensive resale channel built up over ten years, the company is now one of the largest suppliers of POS software in South Africa, with an annual turnover of between R11 million and R12 million.

COMPUTER AND SOFTWARE RETAIL

Another former CUT student, who graduated with a B-Tech in Mechanical Engineering in 2002, is now the owner of a successful computer and software retail business. During his studies at CUT, he was employed as a student assistant in the CRPM. After graduating, he entered the CUT Incubation Programme and launched an IT support and computer service and maintenance enterprise, incorporating hardware sales, website hosting, internet service

provision, network installations, and the supply and installation of CCTV camera systems. He initially employed a deserving student to assist with the servicing of computers whilst he was involved in the part-time maintenance of CRPM equipment.

After leaving the incubation programme in 2007, he opened an office in Bloemfontein, for which he received support from CUT in the form of subsidised office space, access to office facilities like a fax machine and photocopier, as well as general office assistance. According to him, the support he valued most was the advice and assistance he received from the Science Park personnel.

This successful business owner recently opened an office in Kimberley to serve the Northern Cape area and is in the process of signing a contract for another branch in the Eastern Cape. The company employs a total of 14 people and has an annual turnover of about R5 million.

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