HR191	**POSITION DESCRIPTION**	UNIVERSITY OF CAPE TOWN IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

NOTES

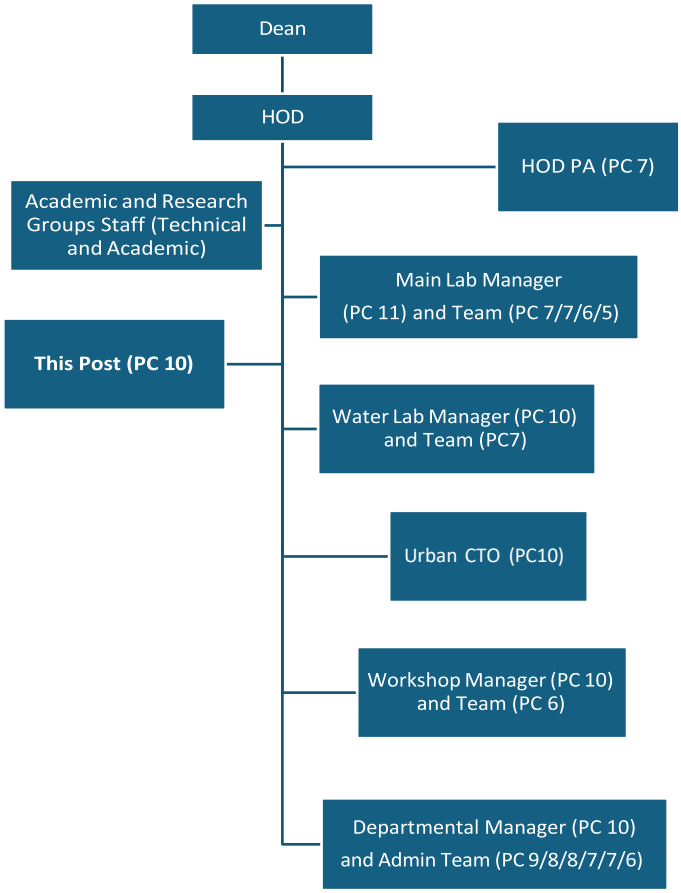
- Forms must be downloaded from the UCT website: https://forms.uct.ac.za/forms.htm
- This form serves as a template for the writing of position descriptions.
- A copy of this form is kept by the line manager and the position holder.

POSITION DETAILS

Position title	CHIEF TECHNICAL OFFICER		
Job title (HR Business Partner to provide)			
Position grade (if known)	PC 10	Date last graded (if known)	
Academic faculty / PASS department	ENGINEERING AND THE BUILT ENVIRONMENT		
Academic department / PASS unit	CIVIL ENGINEERING		
Division / section			
Date of compilation	04.04.2025		

ORGANOGRAM

(Adjust as necessary. Include line manager, line manager's manager, all subordinates and colleagues. Include position grades)



PURPOSE

:

The Chief Technical Officer (CTO) – Data Science and IT provides teaching and research support to the various research groupings in the Department of Civil Engineering, including but not limited to the Centre for Transport Studies, Future Water, CoMSIRU, Computational Continuum Mechanics; in the broad field of sensors and sensor networks/IoT (for data collection), (digital) data collection, databases, data storage management, data mining, data analytics and data visualization, including general support for computer software installation and maintenance where this is not within ICTS' realm. The Chief Technical Officer (CTO) – Data Science and ITalso provides part-time support to the EBE Faculty Office with the maintenance and development of the Student Enrolment Advising Tool (SEAT) and similar tools.

The CTO CIV Data Science and Computing Support will undertake functions throughout the Department and be functionally based in the "Department of Civil Engineering."The CTO CIV Data Science and Computing Support will assist the department with digital data collection (including setting up sensors and sensor networks/IoT for this purpose), database management (including data storage management such as repositories, cloud services and development and execution of metadata protocols), elementary data mining and analytics, which will include coding, as well as data visualization support. The CTO CIV Data Science and Computing Support will assist in preparing, demonstrating and running class teaching laboratories, in the CIV computer science and data sciences space and henceforth collaborate closely with the Department of Computer Science and/or Department of Statistical Sciences. Furthermore, the CTO CIV Data Science and Computing Support will provide support to acquisition, installation, and maintenance of relevant hardware and software/IT (Windows and Linux), in particular for computing and databases, and as such act as a liaison with UCTs High Performance Computing cluster and ICTS; where this is not in the realm of HPC or ICTS. Finally, the CTO CIV Data Science and Computing Support will support EBE Faculty Office with the maintenance and development of the Student Enrolment Advising Tool (SEAT) and similar tools as required by EBE to support staff and students in academic course registration advising as well as in academic student performance monitoring and progression reporting throughout the academic.

Together with the CTO Built Environment, the CTO CIV Data Science and Computing Support will work to assure the Digital Design learning line within our undergraduate civil engineering curriculum is maintained. This strengthens CAD, GIS, BIM, computational modelling and analysis amongst others in the department, which is in line with the universities' "Vision 2030" and the departments' ambition to establish a larger CIV Digital Lab.

Specifically, the following tasks are performed by the CTO CIV Data Science and Computing Support:

Teaching support:

1. The CTO CIV Data Science and Computing Support supports the Built Environment sector and Director of UG Studies with the development and roll-out of a Digital Design learning line in the new Civil Engineering curriculum.
2. The CTO CIV Data Science and Computing Support provides specialist technical services to specific classes or projects that use (big) data, coding, computation and/or database design, in particular give departmental support to the computer science and data science courses in the curriculum; time and scheduling of courses permitting
3. The CTO CIV Data Science and Computing Support performs these duties independently in consultation with Director UG studies, course conveners etc.

Research support:

1. The CTO CIV Data Science and Computing Support provides specialist technical service to CIV research staff and students, wrt digital data collection, database management, elementary data mining and analytics, including basic coding (debugging of scripts and writing of basic code) and some level of data and statistical analysis (e.g. for machine learning), as well as visualization support.
2. The CTO CIV Data Science and Computing Support will set up and assist researchers in the use of programming languages (including Python, SQL and R or equivalent).
3. The CTO CIV Data Science and Computing Support will assist to retrieve, collate and prepare basic (big) data from external data links.

4. The CTO CIV Data Science and Computing Support will assist researchers with access to UCTs High Performance Computing cluster and hence is familiar with Linux operating systems as well.
5. The CTO CIV Data Science and Computing Support performs these tasks independently and as part of the civil engineering research team.

Management, leadership and service:

1. The CTO CIV Data Science and Computing Support manages the Department's data repositories in close collaboration with relevant bodies in the university, such as ICTS and HPC cluster.
2. The CTO manages a range of low/medium cost resources using discretionary decision making and assists research staff in making applications to UCT's Advanced Computing Committee.
3. The CTO participates by undertaking selected departmental responsibilities/administration in consultation with the line manager. Allocated admin tasks and committees within the Department, in line with the Department's collective responsibility model. These responsibilities may change from time to time.

Faculty support:

1. The CTO CIV Data Science and Computing Support develop and maintain the Student Enrolment Advising Tool (SEAT), or similar tools, as per EBE's needs and requirements.

CONTENT

Key performance areas		% of time spent	Inputs (Responsibilities / activities / processes/ methods used)	Outputs (Expected results)
1	Teaching and learning support: Curriculum tasks The development and roll-out of a Digital Design learning line in the new Civil Engineering curriculum.	10%	Engage with the Director of UG studies, the CTO Built Environment and various course conveners in developing, implementing and maintaining the digital design line in the new curriculum, in particular where it concerns coding, data preparation and database management, analytics, computation and visualization.	A digital design learning line is implemented as part of the new Civil Engineering curriculum, in view of the design learning line in the curriculum (ECSA). Students are exposed to and use various coding, computation and data/database techniques as required by course convenors.
2	Technical Support Provide specialist technical services to specific classes or projects that use (big) data, coding, computation and/or database design. Liaise with UCT GIS Unit staff, ICTS and HPC cluster on the latest developments and trends relating to within the digital design space. Manage information flow by informing the department on these developments at requisite forums such as curriculum meetings etc.	30%	Provide technical inputs in the preparation and roll out of UG projects that involve coding, computation and data/databases. Support UG classes and tutorials that involve coding, computation and data/databases. Train tutors and teaching assistants for this task. Appoint, mentor and train course tutors in these fields. Ad-hoc training/induction of new researchers in specific coding languages and / or database software.	Relevant exercises and tutorials are well received by students and academics. Tutors/Teaching Assistants trained. Positive feedback from course conveners, tutors and students.

3	Research support: Providing technical specialist services to CIV research staff and students, wrt digital data collection, database management, elementary data mining and analytics, including basic coding (debugging of scripts and writing of basic code) and some level of data and statistical analysis (e.g. for machine learning), as well as visualization support. Set up and assist researchers in the use of coding languages (Python, SQL, R or equivalent) Retrieve, collate and prepare basic (big) data from external data links, including for example the SANRAL Freeway Management System, Open Street Maps, sensor networks/IoT etc. Equipment – issuing and maintenance of equipment Software – maintenance of licenses for specific cloud-based software. Provide access to UCTs High Performance Computing cluster.	30%	Provide assistance with digital data collection, database management, elementary data mining and analytics, including basic coding (debugging of scripts and writing of basic code) and some data and statistical analysis (e.g. for machine learning), as well as visualization support. Provide basic instruction on the use of coding languages (Python, SQL, R or equivalent). Set up database management systems for retrieving and storing (big) data for long term use. Coordinate and advice on uniformity in departmental coding languages, database software, cloud licenses etc. Assist researchers with access (through Linux) to UCTs High Performance Computing cluster.	Students and academics are able to collect and process digital data. Equipment, hardware and software are maintained and set up for coding, computation and database management tasks. Protocols on metadata, data confidentiality and other SOPs relevant in the data space are set up and communicated. Repositories are set up for long term use. Some level of agreement on use of coding languages. Licenses for storage are maintained and renewed. Researchers have access to the HPC cluster.
4	Management and Leadership: Manage the Department's data repositories in close collaboration with relevant bodies in the university, such as ICTS and HPC cluster.	10%	Compile and manage/apply for software/equipment budget where relevant for the position. Manage the Department's data repositories in close collaboration with relevant bodies in the university, such as ICTS and HPC, with delegated academic.	Database and relevant software contracts organized and funded. Applications submitted to ICTS and HPC cluster. Planning is done.

5	Systems Developer for FO: Design, build, and maintain system-level software and tools to create efficient and robust solutions that integrate into UCT's ICT infrastructure. Proficiencies • Linux operating system • PYTHON • Javascript • HTML • SQL • Django Minor proficiencies • Apache2 • LDAP	10%	System development: • Develop and maintain system-level applications and tools. • Write scripts and utilities for system integration and management. Optimization and Performance: • Analyze system requirements and develop solutions to improve performance and scalability. • Optimize existing applications and tools for reliability and efficiency. Integration and Testing: • Integrate Python-based tools with existing infrastructure and third-party systems. • Develop and execute unit and integration tests to ensure software quality. Automation: • Automate system tasks such as deployment, monitoring, and reporting using Python. • Implement logging and diagnostic tools to monitor system performance. Documentation and Collaboration: • Create detailed documentation for developed systems and processes. • Work collaboratively with cross-functional teams, including DevOps, QA, and operations teams. Security and Compliance: • Design systems with security best practices in mind. • Ensure all solutions meet regulatory and compliance standards.	SEAT, or similar, is developed as per new user requirements. SEAT, or similar, interaction or complementarity with other systems at UCT is sustained where reasonable and feasible.

6	Web application development and system administration Proficiencies: • Linux operating system • PYTHON • Java Script • HTML • SQL • Django Minor proficiencies: • Apache2 • LDAP	10%	System Administration: • Install, configure, and maintain servers, databases, and other IT infrastructure. • Manage user accounts, permissions, and system policies. • Monitor system performance, uptime, and availability. Automation and Scripting: • Develop and maintain scripts for system automation and task optimization. • Automate repetitive system administration tasks such as backups, updates, and patch management. Monitoring and Troubleshooting: • Implement monitoring tools to identify and resolve system issues proactively. • Troubleshoot and resolve technical issues across systems and applications. • Document solutions and maintain knowledge bases. Security and Compliance: • Ensure systems are secure and compliant with industry standards and company	The success of student and class scheduling data refresh of SEAT's database checked daily; Departments assisted to load/modify course curriculum and class scheduling information into SEAT's database during the July-September period; Departments assisted in checking for issues in class scheduling data (as loaded on PeopleSoft as well) during the July- September period; SEAT ready for the undergraduate registration advising during the November-January period; Technical support to staff and students during undergraduate registration campaign during the November-February period provided. Liaison with ICTS regarding (1)

			policies. • Apply patches, updates, and fixes to address vulnerabilities. Collaboration and Communication: • Work closely with development teams to ensure seamless integration between systems and applications. • Provide technical support and guidance to internal stakeholders. System Optimization: • Analyze and optimize system performance using Python-based tools. • Recommend hardware or software updates to improve infrastructure efficiency.	SEAT server maintenance, (2) PeopleSoft student and scheduling data exporting and (3) PeopleSoft class scheduling issues. SEAT, or similar, is up to date and runs throughout the year and can: • estimate the academic year (AYOS) of each student; • estimate the progression codes and degree awards of each student in preparation of FEC meetings; • Checks mid-year curriculum with regard to required changes to the second semester enrolment due to missing prerequisites.

MINIMUM REQUIREMENTS

Minimum qualifications	• Minimum two years' experience in codingprogramming, data science, computing, database management • Experience with programming languages (Python, SQL, or equivalent). • Familiarity with IoT, sensor networks, and digital data collection technologies. • Strong problem-solving skills, with the ability to debug and develop basic code.
Minimum experience (type and years)	2 years relevant experience
Skills	IT competency Basic scripting
Knowledge	IT Competency in coding, databases, database management, computation, visualization
Professional registration or license requirements	n/a
Other requirements (If the position requires the handling of cash or finances, other requirements must include 'Ability to handle cash or finances'.)	

Competencies (Refer to UCT Competency Framework)

Competence	Level	Competence	Level
Analytical thinking/ Problem solving	2	Planning and organizing / work management	2
Building interpersonal relationships	2	Professional knowledge and skill	2
Client/ student services and support	2	Safety awareness	2
Communication	2	University awareness	2

SCOPE OF RESPONSIBILITY

Functions responsible for	As required as part of the position description
Amount and kind of supervision received	As required as part of the position description
Amount and kind of supervision exercised	As required as part of the position description
Decisions which can be made	As agreed with discussions with Line Manager
Decisions which must be referred	As agreed with discussions with Line Manager

CONTACTS AND RELATIONSHIPS

Internal to UCT	Faculty and departmental staff; Collaborators in linked departments – Statistical Science, Computer Science

External to UCT	Vendors and suppliers; counterparts at other institutions