


| SKILLS PROGRAMME DOCUMENT | | | | | |  |
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| Skills Programme Title | | Advanced Spatial Intelligence Data Scientist | | | | |
| NQF Level | 5 | Credits | 40 | Duration in days | 6 Months | |
| Skills Programme ID Number | | SP-210603 | | | | |
| Skills Programme Status | Approved | | | Start Date | End Date | |
| | | | | 21/06/2021 | 21/06/2026 | |
| Last date for enrolment | 21/06/2027 | Last date for achievement | | | 21/06/2030 | |

SKILLS PROGRAMME DETAILS

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| Title | Advanced Spatial Intelligence Data Scientist |
| Sub Title | Spatial Intelligence Data Engineer |
| NQF Level | 5 |
| Duration | 6 Months |
| Credits | 40 |
| Quality Assuring Body | Quality Council for Trades and Occupations (QCTO) |

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| <p>Skills Rationale</p> | <p>There is no denying that the fourth industrial revolution has arrived, and it necessitates a responsive labour force. Given the speed of disruptive trends, traditional economies that maintain the status quo will quickly fall behind. While some countries have yet to implement digital transformation strategies, South Africa is forging ahead with policy development and initiatives that will see the country embrace digital transformation. This evidence from the 2012 National Development Plan (NDP) highlights how ICT will support the development of a connected information-driven society and a vibrant knowledge economy that is more inclusive and prosperous. The NDP further outlines the country's priorities such as i) Raising employment through faster economic growth; ii) Improving the quality of education, skills development, and innovation; iii) Building the capability of the state to play a developmental, transformative role.</p> <p>It is given therefore that in order to remain relevant and competitive in today's environment, digital transformation must be at the centre of the economy. Juxtaposed with the need for transformation is the need to align skills and jobs. People must be at the center of the digital future because of the speed and intensity of change. This necessitates preparing people to take advantage of opportunities while also safeguarding them from the digital age's potential dangers.</p> <p>The objective of this skills program to is to align skills gap created by this transformation with the priorities of the National Development</p> |
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Plan (NDP) 2030, specifically to upskill people in order to create opportunities for them. These skill program also considers the District Development Model, which was recently approved by the president. The President stressed the importance of “a new integrated districtbased approach to addressing our service delivery challenges [and] localize [d] procurement and job creation, that promotes and supports local businesses, and that involves communities...” (Department of Cooperative Governance and traditional Affairs, 2019).

The District Development Model, at its core, emphasizes the importance of integrated planning, collaboration, and a fused economy. Without a doubt, the success of this model is dependent on the ability to make informed decisions and having reliable technology. Data Scientist will be paramount in helping make informed decision but also developing individuals who have both the technical knowledge of manipulating data and scientific knowledge of geospatial analytics is critical.

This skills program is designed to provide learners in the geospatial sector with data science skills and tools which will enable them to solve problems applicable in the digital economy or age. This skills programme is geared towards an individual with a background in Data analytics and wants to grow into advanced spatial analytical methods in Data Science. By applying methodical and procedural analytics to understand causes, inform policy and address critical, policy-relevant questions in human geography, economic geography, planning, environment, and development.

Upon completing this programme, the Advanced Spatial Intelligence Data Scientist will be able to formulate quantitative models to address scientific questions, learn how spatial data science can assist in the discovery of previously unknown patterns. To prepare data for spatial analysis, use data engineering methods and visualization tools.

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| | <p>Learn how to perform suitability analysis, predictive modeling, spacetime pattern mining, and object detection first- hand. Use engaging and compelling technologies to communicate analysis results and insights</p> |
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| Related registered qualification/s | |
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| | <p>The following qualifications are related to the skills programme and registered with the South Africa Qualifications Authority and Quality Council for Trades & Occupations</p> <ul style="list-style-type: none"> • 72206 National Certificate: Computer Science NQF Level 5 Min Credit: 120 • 101407 Occupational Certificate: Geomatics Officer NQF Level 5 Min Credits: 174 • 101442 Diploma in Geoinformation Science and Technology NQF Level 6 Min Credits: 252 • 100772 Diploma in Geomatics NQF Level 6 Min Credits: 360 □ • 117722 Bachelor of Data Science NQF Level 8 Min Credit: 480 • The list below shows the international qualifications which are related to this skills programme • Yonsei University- Spatial Data Science and Applications (short course) • University of California, Irvine - Data Science Fundamentals Specialization (short course) • Liverpool University -Geographic Data Science (BSc Qualification) <p>The list below shows the international qualifications which are related to this skills programme</p> <ul style="list-style-type: none"> • Yonsei University- Spatial Data Science and Applications (short course) • University of California, Irvine - Data Science Fundamentals Specialization (short course) <p>Liverpool University -Geographic Data Science (BSc Qualification)</p> |

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| | <p>The MICT SETA has embarked on a process of developing and registering qualifications which will respond to the Fourth Industrial Revolution demand. The SETA has submitted the qualifications to the Quality Council for Trades and Occupations (QCTO) for approval, here are some of the qualifications that were submitted:</p> <ul style="list-style-type: none">• Artificial Intelligence• Cyber security• Cloud computing• Data science• Software development• Internet of things• Robotic Processing Automation• Design thinking• Quality engineering Automation• eWaste |
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| <p>Purpose</p> | <p>Enhancing digital technology skills in South Africa will help citizens digitally access services and information, which will help improve livelihoods and drive economic growth; this is critical to achieving the ambitions set out in policies such as the National Development Plan and the District Development Model. Geospatial intelligence has proven to be the bedrock and foundation of digital transformation. Geo-enabling the fourth industrial revolution (4IR) is a critical component of this transformative journey. By establishing a Presidential Commission on 4IR to capitalize on the digital revolution, the South African government has made a firm policy commitment to the global trend.</p> <p>Improving service delivery is a prerequisite to assisting the citizens. To improve service delivery, the government must undoubtedly need new or improved ways of doing things. Building digital skills are the first and foremost essential foundation of any digital development, including the establishment of modern digital skills content. Work automation and the prospect of losing jobs is a significant concern in this digital age. Forecasts show a decline in traditional work and an emergency of new roles. There is a considerable gap between the private sector and the public sector, whereby the private sector</p> |
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| | <p>possesses high ambitions for digital adoption of their businesses, whereas the government still lacks the resources, regulation, and skills to support, accelerate and spearhead this digital evolution; therefore, the needs to be a deliberate change focus, upskilling of the workforce on digital transformation to forester culture of innovation.</p> <p>This skills programme is a structured course designed to explore the field and profession of data science with a focus on geospatial intelligence and analytics. This programme will equip the learners with the knowledge and technical skills to use data science methods in geospatial data with an emphasis on answering some of the critical questions. It is geared towards an individual without a background in digital literacy and data science. The program also serves as a doorway to other advanced qualifications such as the diploma in GISc&T. It will be central in helping to address the challenges and realising the opportunities we face in the country, and it will have a key role in the ways that we improve poverty and quality of life outcomes. This skills program will contribute towards the implementation of the coherent District Development Model to improve service delivery in South Africa.</p> | |
| <p>Content</p> | <p><u>Knowledge Component</u></p> <ul style="list-style-type: none"> • 900037-000-00-KM-01, Big Data Analytics in Spatial Intelligence NQF Level 6, Credits 8 • 900037-000-00-KM-02, Geospatial Artificial Intelligence NQF Level 6, Credits 8 • 900037-000-00-KM-03, Spatial Intelligence Augmented and Virtual Reality NQF Level 6, Credits 8 <p>Total Credits: 24</p> | <p><u>Application component</u></p> <ul style="list-style-type: none"> • 900037-000-00-PM-01, Application Development for Spatial Intelligence NQF Level 6, Credits 8 • 900037-000-00-PM-02, Programming for Geospatial-Intelligence NQF Level 6, Credits 8 <p>Total Credits: 16</p> |

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| <p>Minimum entry requirements</p> | <p>The minimum entry requirement for this skills programme is:</p> <ol style="list-style-type: none"> 1. National Senior Certificate, NQF Level 4 2. National Certificate (Vocational), NQF Level 4 3. National N Diploma, NQF Level 5 |
| <p>Exit Level Outcomes</p> | <p>Upon qualifying learners who complete this skills programme will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate knowledge and understanding of the impact of spatial intelligence activities on society, the economy, the industrial environment, and the physical environment, as well as how to address issues. 2. To solve problems related to big data in a geospatial context, use a spatial approach to predictive analysis. |
| | <ol style="list-style-type: none"> 3. Demonstrate your ability to use cloud computing for enterprise solutions by demonstrating your knowledge and skills. 4. Using broadly defined mobile and web applications, design, produce, and communicate geospatial products in a precise and reliable manner. 5. Learn how to use imagery to automate the process of detecting objects and recognizing features. 6. Practice preparing training sample data before training an object detection model with a neural network. 7. Using virtual modeling techniques, model, create, and manage interactive maps and immersive urban environments. |

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| <p>Assessment</p> | <p>Continuous Assessment</p> <p>Assessment to be conducted through E-Assessment which is a form of assessment with an electronic component that includes one or more of the following: e-testing, e-portfolios, and e- marking. The formative assessment methods will include Assignments, class tests, quizzes, and classwork. These assessments are meant to be diagnostic evaluation methods that help to recognize aspects of students learning as they progress to deepen and shape subsequent learning.</p> <p>Supervised Assessment</p> <p>Integrated assessment will deploy variety of assessment methods, tools, and techniques to allow the learner to demonstrate applied competence.</p> <p>Existing assessments include Fieldwork Projects, Building Apparatus Programs, and others. Exams that aim to consolidate previous learning in order to register, mark, or certify the learner's achievement</p> |
| <p>Recognition of Prior Learning (RPL)</p> | <p><input type="checkbox"/> Learners will gain access to the skills programme through RPL for Access as provided for in the QCTO RPL Policy. RPL for access is conducted by an accredited institution, skills</p> |

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| | <p>development provider or workplace accredited to offer that specific skills programme.</p> <ul style="list-style-type: none"> • Learners who have already acquired competencies of modules of a skills programme will be exempted from modules through RPL. Such learners will be awarded credits towards the skills programme. • Learners who complete this skills programme will accumulate credits towards the relevant full or part qualification. The Credit Accumulation and Transfer (CAT) Policy shall apply to these learners |
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| <p>Work Opportunities and further learning</p> <p>.</p> | <p>Careers in data science cut across different industries and sector □</p> <p>Department of Monitoring and Evaluation: Digitize all projects in the country and provide a portfolio of evidence near realtime</p> <ul style="list-style-type: none"> • Statistics South Africa: National Census and any other data collection tasks to have a near-real-time dataset • Local Municipalities: Utilities, Assets, Spatial Plans, Infrastructure, Demographics, SDBIP, IDP, DDM, etc. • Provincial Departments: Roads, Human Settlement Projects, Public Works Assets, <p>APP's etc</p> <ul style="list-style-type: none"> • National Projects e.g. SIPS, MTSF, APP's, Human Settlements, SA Connect, Education, Health etc • Eskom field inspections, field surveys, asset verification and stockpile surveys. • Independent Development Trust (IDT) field data collection and project status monitoring • All 21 SETA's: Shared services, skills centres, location of learners, budgets and expenditure, project information, demographics etc. <p>Agriculture: Agricultural assets, field crops, disasters, animal disease, farm-holder database, farmer register, animal branding, stakeholders, germplasm, genetics datasets, etc.</p> <p>Upon successful completion of 40 credits, learners can articulate to a;</p> |
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| | <p>Horizontal:</p> <ul style="list-style-type: none"> • Higher Certificate in Mathematics and Statistics NQF Level 05 • Higher Certificate in Applied Sciences NQF Level 05 • Higher Certificate in Information Technology NQF Level 05 <p>Vertical:</p> <ul style="list-style-type: none"> • Diploma in Geo-Information Science and Technology at NQF Level 6 • Diploma in Information Technology NQF Level 6 • Diploma: Computer Science NQF Level 6 |
| <p>Skills Development Provider Accreditation Requirements</p> | <p>a) Human resource requirements</p> <ul style="list-style-type: none"> • Facilitator/learner ratio 1:10 <p>b) Physical resource requirements</p> <ul style="list-style-type: none"> • Training Lab with Computers and furniture (chairs and tables) • Training Manuals, Learner Guides • Writing equipment (pencils/paper) • Examples of equipment needed (relevant data, software and GPS devices) <p>c) Legal requirements</p> <ul style="list-style-type: none"> • Accreditation with QCTO <p>d) Safety requirements</p> |