

**UNIVERSITY OF THE
WITWATERSRAND**
LINK Centre, Wits School of Education and
STELLENBOSCH UNIVERSITY
Department of Curriculum Studies

**Course Outline and Study Guide:
Professional Practice: Applications of
Dynamic Software for
Secondary Mathematics Teachers
2020**

**Presented at the
Protea Hotel
Main Road, Saldanha**



Course Outline and Study Guide

Quick Reference

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Role	Contact	Telephone
Course Convenor/Lecturer	Luci Abrahams	082 569 7675
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Lecturer	Alwyn Olivier	
Assistant Lecturer	Songezo Mata	072 026 3196

Academic Staff

Course Convener

Dr Luci Abrahams

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Luci Abrahams is Director of the LINK (learning, information, networking, knowledge) Centre at Wits University. She has been engaged in the arena of ICT and development from 1995. She teaches ICT policy and regulation; digital innovation and digital transformation; analysing knowledge and innovation systems. Her research interests are 'institutions and economic sectors in the emerging digital, knowledge economy'. As a practitioner, she has served on many boards and committees including the Financial and Fiscal Commission (FFC), the Council on Higher Education (CHE), the National Research Foundation (NRF), the State Information Technology Agency (SITA), the National Advisory Council on Innovation (NACI), and the Development Bank of Southern Africa (DBSA). She has a BSc Chemistry (UCT), a Postgraduate Diploma in Public Policy and Development Administration (Wits) and a PhD (Wits). She is the Corresponding Editor of *The African Journal of Information and Communication*, hosted by SciELO South Africa, see http://www.scielo.org.za/scielo.php?script=sci_serial&pid=2077-7213&lng=en&nrm=iso

Dr Erna Lampen

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Erna Lampen holds a BSc Honours (RAU), MEd (Stellenbosch), and PhD (Wits). Her fields of academic interest are Mathematics, Science and Technology. Erna is a lecturer in the Department of Curriculum Studies at the Faculty of Education at Stellenbosch University. Her research interests are within the broader field of pre-service teacher education, with particular focus on aspects of learner and teacher identities in relation to problem-centred mathematics; learning to notice and respond to learner reasoning; and developing conceptual teacher talk specifically in the content areas of geometry and statistics. Her Master's and Doctoral students work broadly within school mathematics education and mathematics clubs. She is actively engaged in the SBIDZ Schools Engagement Programme.

Mr Alwyn Olivier

Alwyn Olivier was, until December 2019, Editor-in-Chief of the academic journal *Pythagoras – Journal for Research in Mathematics Education*. He has over 3000 citations in single authored and co-authored publications, listed on Google Scholar. He holds an MEd in Mathematics Education and is a retired academic, who worked at the University of Stellenbosch for 31 years. He was Director of the Research Unit for Mathematics Education at the University of Stellenbosch from 1997 to 2012 and he is a Past President of the Association for Mathematics Education of South Africa (AMESA). Alwyn is also actively engaged in the SBIDZ Schools Engagement Programme.

Mr Songezo Mata

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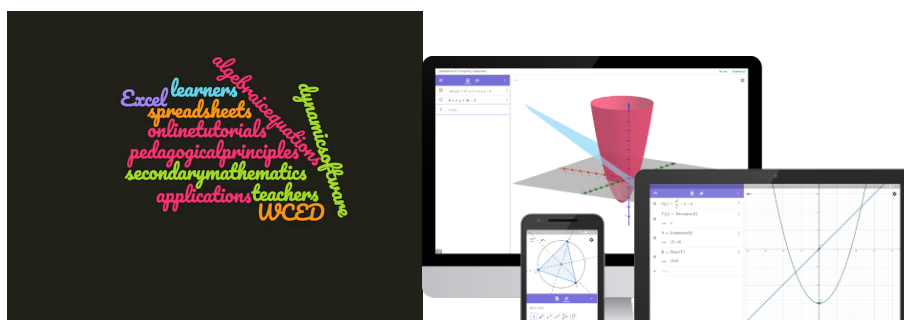
Songezo Mata is currently enrolled for a PhD in Interdisciplinary Digital Knowledge Economy Studies (IDKES) at WITS with research titled "Exploring the early stage digital transformation in secondary mathematics education". His research interest in digital transformation in education, particularly the use of digital tools in the teaching and learning of mathematics in secondary schools. He is a former Grade 11 and 12 Mathematics and Grade 10, 11 and 12 Physical Science teacher. Songezo graduated with a BSc in Education (Mathematics and Education) (Walter Sisulu University), Postgraduate Diploma in Engineering (Satellite Communications) (University of Stellenbosch), Certificate in Telecommunications Policy Regulation and Management (Wits), BCom Honours in Information Systems (cum laude) and MCom in Information Management (University of the Western Cape). He is currently working as a Radio Frequency Measurement Specialist in the Engineering and Technology (E & T) division of the Independent Communication Authority of South Africa (ICASA), conducting spectrum monitoring activities such as spectrum occupancy of International Mobile Telecommunications (IMT) and Public Protection and Disaster Recovery (PPDR) bands. He has vast experience on radio frequency (RF) spectrum matters that are key for wireless communications/mobile technologies through participation in national, South African Development Community (SADC), African Telecommunications Union (ATU) and International Telecommunications Union (ITU) forums.

Introduction and Overview

Welcome to the course **Professional Practice: Applications of Dynamic Software for Secondary Mathematics Teachers 2020!**

In the 21st century, digital technologies are mission-critical enabling technologies for organisations in the public and private sectors. Digital transformation affects all industries, including education. The implementation of digital technologies in education requires the relevant digital skills for both teachers and learners. Teacher professional development courses on the use of dynamic software for teaching mathematics in secondary schools are necessary to advance digital skills and to draw attention to related factors, such as leadership, infrastructure and digital learning processes. This short course is designed for Grade 8 and Grade 9 teachers; and this first offering is sponsored by the Saldanha Bay Industrial Development Zone Licensing Company (SBIDZ-LC). It will subsequently be available throughout the country.

The course runs from **16 to 20 March 2020 (Module 1)** and **08 to 12 June 2020 (Module 2)**. The course is certified at the equivalent of **NQF level 5** (please note that short courses are aligned to, but not formally accredited at NQF levels), with participating academics from the Department of Curriculum Studies, Stellenbosch University and the Wits University LINK Centre. This study guide contains all the essential information about the course. Please read it carefully and use it as a guide in each module and activity of the course.



Source: <https://myexcelonline.podbean.com/> Use: <https://www.wordclouds.com/> Source: <https://www.geogebra.org/>

The WITS LINK (learning, information, networking, knowledge) Centre

The LINK Centre is a self-funded entity in the Faculty of Humanities at Wits, providing post-graduate education, certificate training, research and consultancy services in the broad area of digital transformation, in order to develop public, private, NGO and community-based capacity within the Southern African region. The activities of the LINK Centre encompass the following:

- **postgraduate education and training** courses (degree programmes and certificate courses) in the electronic communications and broadcasting fields, and in digital innovation and transformation, including the Masters of Arts in ICT Policy and Regulation (coursework) and the MA and PhD programmes in Interdisciplinary Digital Knowledge Economy Studies;
- an **interdisciplinary research programme** that addresses critical issues relevant to the public, private and community sectors, disseminating research findings on digital innovation, digital transformation and policy, law, regulation for the digital economy;
- **capacity building services** for public and development institutions in the Southern African Development Community (SADC) and East Africa regions in the areas of policy, regulation and practice for the digital era;
- **knowledge advancement** through hosting public seminars and producing an academic journal, *The African Journal of Information and Communication* (AJIC) to increase the levels of public knowledge of information society and digital economy issues and creating opportunities for debate;
- **advice and information services** to institutions in the fields of telecommunications, broadcasting and digital economy evolution.

Department of Curriculum Studies, University of Stellenbosch

The mathematics division of the Department of Curriculum Studies of Stellenbosch University is committed to professional and community impact in the Western Cape province. Our services are in support of the WCED's goals for the improvement of mathematics education at all levels of schooling, and we offer support with professional development that focuses on mathematical thinking and reasoning.

Saldanha Bay Industrial Development Zone Licensing Company (SBIDZ-LC)

The SBIDZ is the first Special Economic Zone (SEZ) to be located within a port and is the only sector-specific SEZ in South Africa catering specifically to the oil and gas, maritime fabrication and repair industries and related support services. The Saldanha Bay Industrial Development Zone Licencing Company SOC Ltd (SBIDZ-LC) was formally awarded an Operator's Licence on 31 October 2013, marking the formal beginning of our 30-year journey to create a vibrant hub of opportunity, job creation and sustainable growth utilising the SEZ legislation as a catalyst.

Our superb location at the southernmost tip of Africa, in the largest and deepest (23m draught) natural port in the southern hemisphere means that we are the perfect place to accommodate and service a wide range of vessels. We are ideally situated to service East and West African sea traffic, providing a linkage point for both African and international markets. We are committed to creating a competitive and profitable zone for industry investors and local businesses and creating sustainable growth for all partners and stakeholders while ensuring a better future for the community of Saldanha Bay.

COURSE OVERVIEW: APPLICATIONS OF DYNAMIC SOFTWARE FOR SECONDARY MATHEMATICS TEACHERS

This short course provides specialised content for mathematics teachers professional development, with respect to the use of dynamic software, in ways that are relevant to key pedagogical objectives in South African schools. We understand that pedagogy must lead content and tools must support the process of achieving goals. Pitched at the equivalent level to **NQF level 5**, it is designed for educators and government professionals seeking to advance their knowledge with respect to using digital tools in secondary mathematics education. The course offers perspectives, insights, capacity building and advancement in four knowledge areas:

- (i) Understanding the pedagogical principles that are important for selection of dynamic software relevant to advance teaching and learning in algebra and geometry;
- (ii) Understanding the use of dynamic software for teaching algebraic concepts, as well as practicing and applying theoretical knowledge in the classroom;
- (iii) Understanding the use of dynamic software for teaching geometric concepts, as well as practicing and applying theoretical knowledge in the classroom;
- (iv) Combining theoretical knowledge and practical approaches to enhance the capacity to successfully introduce continuous ability to use dynamic software tools to teach mathematics, in order to enhance understanding and improve outcomes into the next decade.

LEARNING OUTCOMES

Educators in the digital age should be persons with a combination of strong pedagogical knowledge, digital skills, technical skills and leadership skills. The course is aimed at educators aspiring to be technology savvy, and covers topics related to technology use in teaching mathematics. Participants successfully completing the certificate course should be able to:

- Discuss the pedagogical principles relevant to teaching and learning in mathematics education
- Demonstrate an understanding of key aspects of practical knowledge with respect to the use of dynamic software
- Demonstrate specific theoretical knowledge that applies to using software tools in mathematics teaching, including how specific tools enable the integration of various pedagogical principles in the teaching and learning experience
- Apply the knowledge and skills acquired in classroom-based assignments

COURSE CONTENT

This course, pitched at the equivalent of NQF level 5, includes the following modules:

BLOCK	MODULE	CONTENT	DESCRIPTION
BLOCK 1 16 – 20 March 2020	Module 1 Applying dynamic software tools in algebra	Patterns, functions, algebraic expressions and algebraic equations	This module covers pedagogical principles and key approaches to using dynamic software in relation to concepts and proficiency associated with patterns, functions, algebraic expressions and algebraic equations.
BLOCK 2 8 – 12 June 2020	Module 2 Applying dynamic software tools in geometry	Space, shape and mensuration	This module covers pedagogical principles and key approaches to using dynamic software in relation to space, shape and mensuration.

COURSE SUMMARY

The classwork component of the course consists of two one-week full-day sessions, run during March and June 2020. Each week is organised as one module. Each module includes a group assignment and an individual applied assignment. Participants are encouraged to apply what is learned during the modules in their classrooms.

1 Session Summary: Algebra

The first block release week includes a brief introduction to the course *Professional Practice: Applications of Dynamic Software for Secondary Mathematics Teachers*.

Module 1: Applying dynamic software tools in algebra: Pedagogical principles and teaching approaches relevant to patterns, functions, algebraic expressions and algebraic equations, using dynamic software (5 days)

A group assignment and a take-home individual applied assignment will be handed out for the module during the block release week. The assignment for Module 1, fully edited, must be submitted electronically to [the course coordinators] at nokhanyo.yolwa@wits.ac.za and nokhanyo/yolwa@gmail.com. The group assignment will be presented in class on Friday 20 March and the final written version of the group assignment must be submitted by 12 noon on Monday 30 March 2020. The individual applied assignment must be submitted by 12 noon on Monday 25 May 2020. Late submissions will be penalised under the applicable terms of the course.

MODULE 1: 2020 SESSION OUTLINES			
PEDAGOGICAL PRINCIPLES AND APPROACHES TO TEACHING PATTERNS, FUNCTIONS, ALGEBRAIC EXPRESSIONS AND ALGEBRAIC EQUATIONS USING DYNAMIC SOFTWARE			
DAY DATE	TIME	TOPIC	LECTURER
Monday 16 March 2020 (lunch 12h00 – 13h00)	09h00 – 10h30	Session 1: Welcome and introductions Context, orientation and pedagogical objectives: From patterns to functions to algebra: <ul style="list-style-type: none"> • Analysis of concepts and skills in the CAPS in relation to algebra and functions • Analysis of a selection of applications in relation to the concepts and skills in CAPS 	Luci Abrahams Erna Lampen Alwyn Olivier
	11h00 – 14h00	Session 1a: Numeric and geometric patterns From CAPS to textbook to technology: Finding relationships between terms in a sequence to generate more terms; relationships between the position of a term and the term to generate more terms; translating geometric patterns to number sequences by developing rules to find the relationship between terms and their position in the sequence; investigating different ways to describe the same sequence.	Erna Lampen and Alwyn Olivier
	14h00 – 16h00	Session 1b: Practice in groups <ul style="list-style-type: none"> • Concept focus: the gradient of functions • Group exercise will be shared with the class, with guidance on the requirements for successful completion. Presentation session is on Friday 	All

Short Course: Applications of Dynamic Software for Secondary Mathematics Teachers 2020

Tuesday 17 March	09h00 – 12h00	Session 2a: Numeric and geometric patterns <ul style="list-style-type: none"> Using journal articles to build professional knowledge and quick introduction to referencing (45 minutes) From CAPS to textbook to technology (continued): Finding relationships between terms in a sequence to generate more terms; relationships between the position of a term and the term to generate more terms; translating geometric patterns to number sequences by developing rules to find the relationship between terms and their position in the sequence; investigating different ways to describe the same sequence. 	Luci Abrahams Erna Lampen and Alwyn Olivier
	13h00 – 16h00	Session 2b: Excursion: SBIDZ site visit <ul style="list-style-type: none"> Reflecting on Mathematics around us – opportunities for the study of functional relationships in the context of the evolution of the SBIDZ (1 hour 45 minutes) Workshop potential contexts for Grade 8 Mathematics in applications in the Saldanha Bay area 	All
Wednesday 18 March	09h00 – 12h00	Session 3a: Functions and relationships Analysis of textbook tasks and of selected tech tools for <ul style="list-style-type: none"> Understanding dependence of one variable on another; Describing relationships in terms of flow diagrams, tables, words and symbolic formulae. 	Erna Lampen and Alwyn Olivier
	13h00 – 16h00	Session 3b: Practice in groups <ul style="list-style-type: none"> Working with tech tools to develop procedural fluency. Finalising the topics for group presentations on Friday. 	All
Thursday 19 March	09h00 – 12h00	Session 4a: Algebraic equations <ul style="list-style-type: none"> Finding numbers, called solutions, that make the equations true; using tables to recognize equivalent expressions (with the same solution); finding solutions by inspection and testing them. Focus on Graphs 	Erna Lampen and Alwyn Olivier
	13h00 – 16h00	Session 4b: Practice in groups Tech tools to relate formulae, equations, and flow diagrams to graphs.	All
Friday 20 March	09h00 – 12h00	Session 5a: Group project work for Module 1 <ul style="list-style-type: none"> Groups get time to finalise their presentations Assessment criteria for peer assessment Presentations 1, 2 and 3 	All
	13h00 – 16h00	Session 5b: Practice in groups <ul style="list-style-type: none"> Presentations 4 and 5 Orientation to the site based assessment for Module 1 Feedback and closing 	All

Module 1: Applying dynamic software tools in algebra

QUICK COMMENT

Digital skills that are key to the use of digital tools in the teaching of mathematics in secondary schools are explored. Digital transformation is characterised as digitisation of products, services and processes to improve efficiencies in organisations. The teaching (process) of mathematics using digital tools represents one of the key aspects of digital transformation in the education environment. Initiatives to build digital skills are common in many fields, particularly in the banking sector, in the manufacturing sector, and in the oil and gas sector. In all these sectors, data and analytics are powerful enablers, requiring strong mathematics foundations. A 2019 article in *Digitalist Magazine* reports sector analyst Geoffrey Cann as saying:

“When I first started my career, data was basically numbers presented in rows, columns, and the occasional chart in a spreadsheet. Data was scarce,” he reflected. “But now, data is ridiculously abundant and can represent images, sounds, and odors, along with measures like pressures, speeds, temperatures, orientation, and locations. Even the contents of text messages, tweets, and Facebook posts can be used to measure sentiment and emotions.”

To read this article, see <https://www.digitalistmag.com/digital-economy/2019/08/06/digital-paradox-of-change-in-oil-gas-industry-06200036> The article reveals that there is increasing need for people with capacities to collect, understand, manage and analyse data, including people in the oil and gas sector. Data analytics today uses digital tools extensively, including excel spreadsheets; business intelligence tools for data visualisation such as Tableau; tools for statistical and predictive analytics such as R and Python; and many other tools. In this module, we consider only the basic dynamic software tools such as Excel and GeoGebra.

In addition to digital skills, other elements are essential for successful teaching, including institutional leadership, school connectivity and ‘real’ digital learning. This module focuses on digitally supported approaches to teaching key parts of the curriculum for Grade 8 and Grade 9 algebra.

MODULE OBJECTIVES

At the conclusion of the module, participants should understand:

1. Pedagogy must lead content and tools must support pedagogy.
2. Ways of using dynamic software to teach:
 - (a) Numeric and geometric patterns;
 - (b) Functions and relationships; and
 - (c) Algebraic expressions.
3. Pedagogical principles that inform the delivery of content during class.

EVALUATION

To successfully complete the module on the use of dynamic software for teaching algebra, participants will be required to pass examined assignments. The assignments will relate to lectures and readings.

Group Assignment	30%
Individual applied assignment	70%
Total	100%

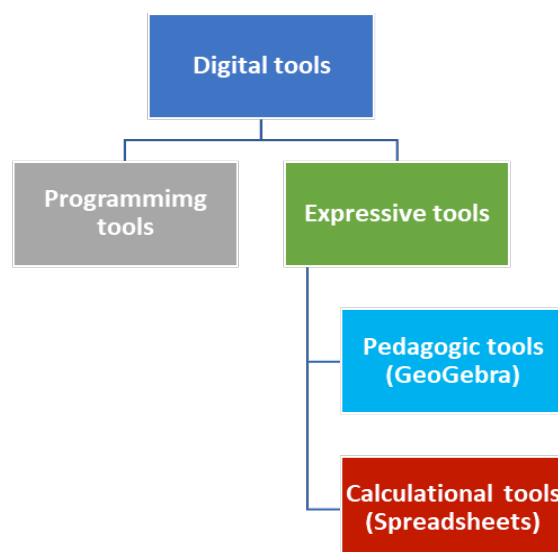
PEDAGOGICAL PRINCIPLES INFORMING THE DESIGN OF THE CURRICULUM

Ten pedagogical principles were developed and used to inform the design of the curriculum, namely: (1) imposing structure; (2) refraining from calculation; (3) independence vs dependence – relate variables; (4) working deductively and inductively (i.e. deductive reasoning is when you move from a general statement to a more specific statement through a logical thought process while inductive reasoning is characterized by the inference of general laws from particular instances); (5) thinking backwards and forward; (6) agility – using different representations; (7) conceptual literacy (maths language); (8) engagement with learner thinking; (9) contextual digital literacy; and (10) representational/drawing.

CLASSIFICATION OF DIGITAL TOOLS

Kay and Kwak (2018) provide a classification of five types of apps: instructive, practice-based, constructive, productive and game-based. Bray and Tangney (2017, p.259) also provide two main technology classification schemes: (1) programming tools, that provide novel ways of modelling and representing mathematics (eg. Mathsticks and SimCalc), and (2) expressive tools, that provide easy access to the results of algorithms and procedures, without the user being required to understand the intricacies of their calculation. Expressive tools are further broken into two (a) pedagogical tools, designed specifically for the exploration of a mathematical domain (eg. GeoGebra) and (b) calculational instruments (i.e. spreadsheet programs). Mainly expressive tools, namely GeoGebra and Excel will be used in the course. Figure 1 below depicts the classification of digital tools.

Figure 1: Classification of digital tools (Source: Adapted from Bray & Tangney, 2017)



ANALYTICAL FRAMEWORK FOR SELECTING DIGITAL TOOLS

There are ten (10) characteristics that can be used to evaluate apps, such as learning value, content quality, learning goals, usability, engagement, challenge level, feedback and collaboration (Kwak & Kwak, 2018), as well as modification and redefinition, which are linked to transformational ways of teaching and learning (Bray & Tangney, 2017). Table 1 below provides the list of the ten characteristics from the framework for selecting digital tools such as GeoGebra, and to some extent, Excel. Kay and Kwak (2018, p.756) argue that “many apps do not provide explicit learning goals, nor do they connect the math app to specific course curricula. The authors suggest that teachers can supplement this process by communicating learning goals to the class and selecting apps that meet

course learning objectives”. Once the type of math app is selected, the teacher can then evaluate it based on the characteristics discussed below. Mouza (2019) found that professional teacher development programs are effective in improving digital skills and raising awareness about pedagogical approaches technology affords.

Table 1: Framework for selecting digital tools (Source: Adapted from Kay & Kwak, 2018; Bray & Tangney, 2017)

Characteristics	Description
Learning value	Structures, trial and error, gamification, remembering, understanding, applying, analyzing, evaluating, creating, achieving, fluency, academic improvement
Content quality	Accuracy and faithful to underlying math principles
Learning goals	Clear objectives, personal mastery of basic skills, promote higher-order skills, remediation of skills, promote technological literacies, promote skills development, influence learner behavior, to make or build something, exploration of interests, and pursuit of peer interaction
Usability	User-friendly, appropriate language, distraction-free, clear instructions, easy to follow, intuitive, navigation
Engagement	Emotional (look and feel, entertainment value, fun, exciting), behavioral (rich interactions, persistence) and cognitive (pacing, control over settings, desire to participate)
Challenge level	Adaptability, differentiation, levelling, independent learning, selecting content parameters, instructional pacing
Feedback	Scaffolding, hints/corrective, formative, accommodations, tracking, progress reports, text versus visual feedback, intrinsic versus extrinsic
Collaboration.	Social interaction, sharing
Modification	Technology allows for significant task redesign
Redefinition	New tasks, previously inconceivable without technology

The dynamic software GeoGebra meets almost all the ten (10) characteristics and requires basic and intermediate digital skills to operate. Creating and modifying GeoGebra applets requires programming/coding capabilities, which is associated with advanced digital skills. The Excel spreadsheet program is a useful tool for numeric analysis and has a graphic feature.

SESSION OUTLINES

Sessions	Topics	Presenters
Lecture sessions 1a, 1b and 2a	<p>Specific learning outcomes (applicable to all lecture sessions)</p> <ul style="list-style-type: none"> • Understanding the underlying pedagogical principles for the selection of dynamic software learning tools including applets and Excel spreadsheets • Understanding how to use applets and spreadsheets in ways that improve the teaching experience beyond simply replacing the blackboard with software • Understanding how to use applets and spreadsheets in ways that improve the quality of the learning process and experience, both in the classroom and in the homework environment • Understanding how to select applets from a wide range of available tools so that teachers can use GeoGebra as a holistic (open source) application • Using dynamic software to use and select applets for demonstrating particular aspects of the algebra curriculum • Reading and dissecting an article and using basic referencing techniques <p>Download/Install/Use You can watch the YouTube video The Beginner’s Guide to Excel – Excel Basics Tutorial, available at https://www.youtube.com/watch?v=rwbho0CgEAE You can visit the GeoGebra website to download and install the GeoGebra application at https://www.geogebra.org You can download and use GeoGebra 4.4 in a nutshell manual at http://school-maths.com</p> <p>Please watch the LA Sevens Final South Africa v Fiji at https://www.youtube.com/watch?v=bpmg4y0QLKM</p> <p>Numeric and geometric patterns</p> <ul style="list-style-type: none"> • The term-term relationship in sequence (Grade 8, chapter 4.1) • The position-term relationship in a sequence (Grade 8, chapter 4.2) • Different kinds of patterns in sequences (Grade 9, chapter 6.3) • Describe patterns in different ways (Grade 8, chapter 4.4) • Geometric patterns (Grade 9, chapter 6.1) • More patterns (Grade 9, chapter 6.2) • Formulae for sequences (Grade 9, chapter 6.4) <p>You can download and use the following applets for this session; and explore and find your own applets:</p> <ul style="list-style-type: none"> • Solving equations with models at https://www.geogebra.org/m/w4DnWSFy#material/PfkuZ79f • Variable expressions with addition and subtraction at • The Z pattern at https://www.geogebra.org/m/YTXrG3Cz • The L pattern at https://www.geogebra.org/m/XE9zD4Qp • Growing patterns at https://www.geogebra.org/m/WBt3vk2K • Stacking bricks – sequence at https://www.geogebra.org/m/NXk9wFuH • Writing an expression for a sequence at https://www.geogebra.org/m/w4DnWSFy#material/vuWjXbbq 	Erna Lampen and Alwyn Olivier
Lecture sessions 3a and 3b	<p>Functions and relationships</p> <ul style="list-style-type: none"> • Constant and variable quantities (Grade 8, chapter 5.1) • Find output numbers for given input numbers (Grade 9, chapter 6.1) • Different ways to describe relationships (Grade 8, chapter 5.2) • Algebraic symbols for variables and relationships (Grade 8, chapter 5.3) • Different ways to represent the same relationship (Grade 9, chapter 7.2) • Different representations of the same relationship (Grade9, chapter 7.3) <p>You can download and use the following applets for this session; and explore and find your own applets:</p> <ul style="list-style-type: none"> • Graphing independent and dependent variables at https://www.geogebra.org/m/brr9r5rq • Unknown linear values at https://www.geogebra.org/m/nzvvj3dh 	Erna Lampen and Alwyn Olivier

<p>Lecture sessions 4a and 4b</p>	<p>Algebraic expressions</p> <ul style="list-style-type: none"> Algebraic language (Grade 8, chapter 6.1; grade 9, chapter 8.1) Add and subtract like terms (Grade 8, chapter 6.2) Combining like terms in algebraic expressions (Grade 9, chapter 8.3) Properties of operations (Grade 9, chapter 8.2) Multiplication of algebraic expressions (Grade 9, chapter 8.4) Dividing polynomials by integers and monomials (Grade 9, chapter 8.5) Products and squares of binomials (Grade 9, chapter 8.6) Substitution into algebraic expressions (Grade 9, chapter 8.7) <p>You can download and use the following applets for this session; and explore and find your own applets:</p> <ul style="list-style-type: none"> GeoGebra mathematics applications at https://www.geogebra.org First binomial formula at https://www.geogebra.org/m/kqFv4YJz Binomial formula at https://www.geogebra.org/m/QbkrkRuA Area model for binomial multiplication at https://www.geogebra.org/m/eSTrSG6x Area Model – Polynomials at https://www.geogebra.org/m/bamcyetS 3D algebra tiles illustrator-polynomials at https://www.geogebra.org/m/usVjhg2T Cubic 3D visual-polynomial functions at https://www.geogebra.org/m/CWB2DJF_u#material/rrt2YAWF 	<p>Erna Lampen and Alwyn Olivier</p>
<p>Lecture sessions 4a and 4b</p>	<p>Algebraic equations</p> <ul style="list-style-type: none"> Setting up equations (Grade 8, chapter 7.1; Grade 9, chapter 9.3) Solving equations by inspection (Grade 8, chapter 7.2; Grade 9, chapter 9.1) More examples (Grade 8, chapter 7.3) Solving equations using additive and multiplicative inverses (Grade 9, chapter 9.2) Equations and situations (Grade 9, chapter 9.4) Solving equations by using the laws of exponents (Grade 9, chapter 9.5) <p>You can download and use the following applets for this session; and explore and find your own applets:</p> <ul style="list-style-type: none"> Solving equations with models at https://www.geogebra.org/m/w4DnWSFy#material/PfkuZ79f Variable expressions with addition and subtraction at https://www.geogebra.org/m/w4DnWSFy#material/EhvKRMze Variable expressions with multiplication and division at https://www.geogebra.org/m/w4DnWSFy#material/PmNdP5ma Tiles around a pool: Writing expressions https://www.geogebra.org/m/w4DnWSFy#material/kYH8cTy5 	<p>Erna Lampen and Alwyn Olivier</p>

Module Readings	Prescribed Books Textbooks	
	<p>DBE. (2017). Mathematics Grade 8 CAPS Learner Book. Rietondale: The Ukuqonda Institute.</p> <p>DBE. (2017). Mathematics Grade 8 CAPS Teacher Guide. Rietondale: The Ukuqonda Institute.</p> <p>DBE. (2017). Mathematics Grade 9 CAPS Learner Book. Rietondale: The Ukuqonda Institute.</p> <p>DBE. (2017). Mathematics Grade 9 CAPS Teacher Guide. Rietondale: The Ukuqonda Institute.</p> <p>Readings</p> <p>Bray, A., & Tangney, B. (2017). Technology usage in mathematics education research: A systematic review of recent trends. <i>Computers and Education</i>, 114, 255-273. http://dx.doi.org/10.1016/j.compedu.2017.07.004</p> <p>Transformational use of digital tools is associated with the two stages of the SAMR model, namely, modification and redefinition, which have been added as characteristics for evaluating apps. With respect to modification, technology allows for significant task redesign, whereas redefinition allows for the creation of new tasks previously inconceivable without technology. These two characteristics are important in ensuring that the use of digital tools moves beyond being a substitute, adding value to the teaching and learning process.</p> <p>Kay, R. & Kwak, J. (2018). Creating an evidence-based framework for selecting and evaluating mathematics apps. SITE 2018 - Washington, D.C., United States, March 26-30. Retrieved from https://www.researchgate.net/publication/325154177</p> <p>The authors discuss eight characteristics that can be used to evaluate apps, such as learning value, content quality, learning goals, usability, engagement, challenge level, feedback and collaboration. Usability, feedback and learning value are some of the key features of dynamic software.</p> <p>Stols, G., Ferreira, R., Pelsler, A., Olivier, W. A., Van Der Merwe, A., De Villiers, C. & Venter, S. (2015). Perceptions and needs of South African Mathematics teachers concerning their use of technology for instruction. <i>South African Journal of Education</i>, 35(4), 1-13. http://dx.doi.org/10.15700/saje.v35n4a1209</p> <p>The use of digital tools is associated with numerous facilitating conditions such as adequate equipment, power, internet connectivity and apps, amongst others. Some dynamic software is freely available, which makes it accessible to all schools with devices and internet connectivity, accompanied by basic/intermediate digital skills of users.</p> <p>Additional readings</p> <p>Hoyles, C. (2018). Transforming the mathematical practices of learners and teachers through digital technology. <i>Research in Mathematics Education</i>, 20(3), 209-228, https://doi.org/10.1080/14794802.2018.1484799</p> <p>McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J. & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. <i>Journal of Research on Technology in Education</i>, 48(3), 194-211. https://doi.org/10.1080/15391523.2016.1175856</p> <p>Mouza, C. (2002) Learning to teach with new technology. <i>Journal of Research on Technology in Education</i>, 35(2), 272-289, DOI: 10.1080/15391523.2002.10782386</p> <p>Pfeiffer, C. (2018). Mathematical knowledge in a Geogebra-focused learning environment (Doctoral dissertation). Retrieved from https://scholar.sun.ac.za/handle/10019.1/102718</p> <p>Smith, J.G., & Suzuki, S. (2014). Embedded blended learning within an algebra classroom: A multimedia capture experiment. <i>Journal of Computer Assisted Learning</i>, 31, 133-147. https://doi.org/10.1111/jcal.12083</p>	

ASSESSMENT OF PERFORMANCE

The mark for each module of this course will be made up of two components:

- Short course assignment/s, to be done in groups of four or more course participants. This will be carried out and assessed during the course. The mark for the assignment/s will count for **30%** of the overall course mark for each module.
- A written examination. The format will be either a take-home examination, or a closed book, or an open book examination, depending on the approach of the responsible lecturer. The mark for the examination will count for **70%** of the overall course mark for each module.
- **Deadlines for the submission of all assessment material, assignments, take-home individual examinations, and case studies will be formally advised to the participants on the course. Wits University's late submission penalties will be strictly adhered to during the course.**

LEARNING APPROACH

The course has been structured to facilitate an active learning process, which allows for periods for reflection, learning of new knowledge and application. Given the nature of professional development courses, it is expected that participants will take responsibility for their own learning and also learn independently. This course outline and study guide is considered to comprise the learning contract between the participants and the lecturers. Please ensure that you clarify all aspects of the course outline in the first session of each module. Participants are expected, where possible, to implement what they have learned while at work and to review whether these were useful strategies.

A variety of learning methods, including lectures, case studies, simulations, workshops, preparation and presentation of group discussions, will be utilised. Participants are expected to devote time to group interaction and the exchange of experience. This approach is designed to:

- Enable participants to contribute actively to the course by injecting their practical and professional know-how into the learning process.
- Assist participants to identify their own learning needs and pursue learning opportunities that will strengthen their development.
- Encourage the application of the process to their everyday teaching challenges.

In order to take full advantage of each of the modules, it is essential that you:

- Do the required reading and preparation for each module. Lecturers assume that participants are prepared for class and structure the session accordingly.
- Participate actively in all sessions. This participation is vital to ensure that you have understood the core concepts and applications for the module you are undertaking.
- Complete post-module assignments and examinations for evaluation and reflection on time. This enables you to receive feedback and improve the quality of your work.

In order to make the most of this learning process, it is essential that participants prepare for class and complete work on time. The tight deadlines related to the course cannot be pushed out as it affects the broad learning process as well as the participants' opportunities for adequate feedback and interaction with colleagues and lecturers. We do understand that you are all busy working professionals and that crises arise but you will only benefit from the course if you can meet the requirements and work to deadline.

LOGISTICAL DETAILS

Course Readings

Most required course readings are available free to download from the Internet, or are provided on a memory stick. Please carry these with you at all times during the course.

Registration

Thank you for completing the online Google spreadsheet for registration.

Note: Should any of your personal details change during the delivery of the course, it will be your responsibility to convey this information to the course convenor.

Orientation

The orientation session for the course took place on Wednesday 12 February. This was an opportunity to meet all participants. Prospective participants were informed about the basic aims, structure, content and process of the course.

Structure and Duration

The course summary and module outlines above provide details regarding the aims, structure, content and organisation of the course, which runs over approximately 5 months, including assignments and exams. You are required to attend, complete and pass both modules.

It is expected that you have made the necessary arrangements with your schools for release onto the course. If you do have a problem with attendance, please contact the course convenor immediately to discuss the necessary arrangements.

Expectations and Obligations

It is expected that all participants, once registered, fully bind themselves to the organizing principles of the course. In this regard, we emphasise the following principles:

- Commitment (*to the learning process*)
- Participation (*in all learning activities*)
- Learning by doing (*active in discussions*)
- Interaction with peers (*working in groups*)
- Confidentiality in the learning process.

Course Work

Apart from lecturers' inputs and other types of input, the course places emphasis on course work, which consists of two components. Firstly, group assignments, and secondly, individual assignments/exams.

In addition, background readings, are considered very important reference tools. All participants are expected to read at least one substantive article during each module week, and all three recommended articles between modules.

In general, the university expects that this course takes approximately 150 hours for you to complete. Only 60 of these hours are spent in the classroom as contact time. The rest of the time is to be spent reading, completing assignments and tasks, interacting with colleagues and testing applications.

When preparing, please make notes of queries or arguments you wish to bring to discussion in groups or plenary.

Learning Group Work

Small learning group work is a critical and integral part of the course. A major objective of these groups is to assist participants in developing their own understanding, and to feed group discussions into plenary.

When reading articles, focus should be placed on clarifying main issues, discerning underlying perspectives, and generating interesting questions for wider group discussions.

As teacher professional development is not an exact science, the same reality can be constituted in a variety of different, often conflicting ways. Groups and individuals should strive to explore alternatives inherent in such perspectives.

Please **note** that the objectives of group discussions are not necessarily to secure agreement or consensus. Disagreements over the definition or resolution of a problem should be taken as a healthy expression of learning.

In groups, individuals should attempt to:

- Practice their leadership skills – without dominating discussion;
- Develop their listening abilities – without reducing their role to mere listeners;
- Develop a capacity to conduct group/team work;
- Develop recording and reporting skills.

Often this involves parties negotiating or working to temporarily suspend a perception of themselves as being there to represent an organisation, viewpoint, or even any set of fixed beliefs. The purpose of an exercise is often to explore a whole range of possible ways to look at a problem, and the many alternatives inherent in this. For this reason, open thinking is strongly encouraged.

Evaluations

A lecturer and module evaluation questionnaire will be distributed after the first module and at the end of the course. Participants are requested to fill it in as honestly as possible. For lecturers these evaluations are used in three ways: firstly, to make adjustments to courses on the basis of comment received; secondly, to improve their teaching and learning process; and thirdly, to secure promotion.

If you think that we are not meeting our obligations as individual academics or as a school, please tell us. It is important for us to receive both positive and negative feedback to ensure that you have an excellent learning experience.

Teaching and Learning Policy

Wits has developed a collection of regulations and guidelines entitled the "Teaching and Learning Policy" through a process of consultation with lecturers and students and the following guidelines are applicable to the certificate course. It is intended that the policy will operate as an enabling framework and a clear indication of expectations, which will facilitate effective teaching and learning.

Formal regulations are determined by the University and the Faculty Board and as such constitute the framework in which participants and lecturers operate. These guidelines have been developed as a consequence of the experience of lecturers, administrators and participants in short courses.

COURSE MANAGEMENT STRUCTURE

In order to manage the various relationships involved in short course education, the following meetings are relevant:

- **Academic and course planning meetings:** at these meetings core decisions relating to the delivery of courses are made. These include curriculum course content, structure and administration.
- **Faculty Board meetings:** decisions affecting faculty wide policy are taken at these meetings.
- **Class representative meetings:** these meetings enable participants to raise critical issues relating to the teaching and learning process. Ideas generated at these meetings can inform our approach.

The key academic management responsibilities relevant to this course are:

- **Course Convenor:** manages the short course to ensure achievement of mission and co-ordinates particular modules of the course.
- **Course Administrator:** is responsible for all immediate administrative needs. They receive and record assignments, issue course materials and assist you with queries related to the administration of the course.

Grievance Procedure

Any problems or grievances that you may have need to be taken up through this management structure. In other words, a problem or grievance should:

- First be taken up with the Lecturer concerned in the case of a problem that is specific to a course;
- If this does not resolve the problem, or if the problem is with the lecturer, then the problem should be taken up with the Convenor, who in this case is the Head of the LINK Centre;

- If this does not resolve the problem or if the matter is wider than the course itself, then the matter can be taken up with the Head of School and then the relevant Dean under exceptional circumstances. Contact with the Dean must be arranged through the Faculty Office (Faculty of Humanities).

TEACHING AND LEARNING APPROACH

The teaching approach on the course is directed towards ensuring that course participants leave with the skills and understanding to become effective managers. This means that Wits University subscribes to what is commonly understood as adult teaching principles. These include ensuring the following:

- A comfortable and relaxed learning environment
- Learning by doing
- A variety of teaching methods
- Realistic problem solving exercises
- Social activity

Within this context, the COURSE uses **interactive, discussion-based methodologies** designed to achieve specific learning objectives and develop independent thinking and problem solving skills. The discussion method requires course participants to identify and analyse problems, form reasoned interpretation and test conclusions using their own knowledge and experience.

The COURSE teaching and learning methodology is further based on a “mixed” approach whereby the teaching and facilitation processes are varied in order to ensure the best possible delivery of the subject matter at hand.

In addition, the COURSE stresses the need for **group interaction and team process skills** by requiring course participants to work in learning groups. Learning groups enable course participants to share experiences and deal with some or many of the problems of working in project teams on the job or across institutions. They can also be a learning support network and community of practice for course participants.

Course Outlines and Readings

The study guide and course outline should be viewed as a contract between a lecturer and his/her course participants. Along with providing materials relevant to the course, the course outline provides the course participant with all the necessary information regarding the course as a whole. This ensures that course participants are aware beforehand of their commitments with respect to the course as regards preparation, presentations, projects, examinations and the like.

Please read the course outline carefully at the beginning of the course and make sure you are familiar with due dates for assignments.
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ASSIGNMENTS

The purpose of individual and learning group exercises and assignments is twofold:

- They enable the lecturer to assess participants' understanding of key concepts, as well as their ability to apply this understanding in "real" contexts.

- They enable participants to assess their own understanding of key concepts and their ability to apply these in exercises and assignments.

Plagiarism

Plagiarism is considered a serious offence by the University and all Schools, including SLLM, have a School Plagiarism Committee to deal with such offences. The University Plagiarism Committee can expel the course participant and take legal action against him/her. In terms of University policy, we require course participants to sign a declaration on plagiarism that contains the following commitments:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work I will submit for all assessment for the above course is my own unaided work.
- I will follow the required conventions in referencing the thoughts and ideas of others. I am aware that the correct method for referencing material is described in the APA style free online tutorial and APA style blog, and has been presented and discussed in class.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Copying in Individual Assignments

Course participants are encouraged to discuss general approaches to individual assignments with their learning groups and other course participants but the final product must be the course participant's original work. If a lecturer thinks that copying has taken place the course participants involved must be given written notice to meet with the lecturer to discuss the issue. If no acceptable explanation is provided all course participants involved will receive zero for the assignment.

Submission of Assignments

All assignments must be submitted electronically to Nokhanyo Yolwa at both the following email addresses nokhanyo.yolwa@wits.ac.za and nokhanyo.yolwa@gmail.com. Course participants must always keep a copy of the final version of their assignments. Late assignments carry penalties. It is your responsibility to make sure that you submit on time. You must stick to these deadlines and plan your time accordingly.

Course participants will lose 5% for each week that the assignment is late without a valid excuse. After four weeks the participant will lose 20% for the assignment and no submissions will be marked after that. **Extensions must be applied for in advance of the due date for the assignment.** If you know you will not be able to complete on time and have a valid excuse (see below) you must apply before the due date. Applications received after the due date are usually treated unfavourably as they indicate poor planning and failure to give adequate attention to studies.

Extensions

Course participants may apply for an extension under the following circumstances:

Individual Crisis:

An **individual** may apply **in writing to the lecturer concerned, BEFORE the due date** for the assignment. An extension of the due date under the following circumstances:

1. **Bereavement**
2. **Illness** - a doctor's certificate **MUST** be provided as evidence and a letter explaining why the extension is necessary.
3. **Exceptional obligations arising from employment** - in this instance, the application must be accompanied by *bona fide* written evidence of the obligations from the line manager or organisation concerned.

PLEASE NOTE: General pressure of work is not regarded as sufficient reason for an extension as this clearly applies to most course participants in most work situations. Most course participants are working full-time, and many are in demanding positions. In commencing your studies, you are accepting responsibility for taking on additional evening and weekend work to complete the course, and managing your time appropriately. Poor time management and planning is not a valid excuse for late assignments.

An application for extension is more likely to be favourably considered when the group or individual is able to provide evidence of work on the assignment completed to date. If extensions are requested for any other reasons than those mentioned above, the following criteria will be used to decide on whether an extension is granted: the track record of the course participant's prior performance, the validity of the circumstantial problems, the advantage to the course participant of granting an extension, equity with respect to the rest of the class.

This application must be made in writing to the lecturer and must provide a full and detailed account of the circumstances that have made it impossible to complete the assignment and must stipulate a new due date for submission of the assignment. Please email the request to Nokhanyo Yolwa at the email addresses provided.

Class Needs:

The **class** may negotiate for the extension of an assignment due date using the following procedure:

1. Written application for the extension must be handed to the lecturer by the class representative(s) concerned no less than **one full week** prior to the stipulated deadline.
2. The lecturer will then consult with the course convenor, following which s/he will make the decision to grant the extension or not. This will only be granted in exceptional circumstances.

Assessment

The assessment structure below is used to mark exam assignment questions.

F	Less than 50%	FAIL
D	50% - 59%	Third Class Pass
C	60% - 69%	Second Class Pass
B	70% - 74%	Upper Second Class Pass
A	75% and above	First Class Pass

For a final exam, a mark of “failed absent” will be recorded and a mark of zero will be given where a course participant does not submit an exam and is not granted a deferred exam. This means that you are not allowed to continue with the course.

Mark Allocation

The University has set up the following guidelines:

- The examination must constitute a minimum of 50% of the overall course mark and must be an individual examination. This may be a take-home examination or an examination equivalent assignment. The lecturer concerned decides the type of exam.
- The University has placed an upper limit of 30% of the total course mark on learning group work (presentations, assignments, etc.).
- The balance of the work for the course will make up the remaining marks to be allocated. This must be made up of individually evaluated work such as the examination, tests, or individual assignments.

Marking Scheme

A “marking scheme” for assignments is outlined below. This indicates the methods of grading (A - F), and the requirements that need to be satisfied for the allocation of each grade:

Grade A (75+)

Shows insight and creative thought. Synthesises different ideas and models drawn from the relevant reading material and dynamic software tools. Attempts to resolve problems or makes decisions in an evidence-based way. Structures the assignment answer in a logical and coherent manner. Presents the material clearly. **Originality of thought and depth of critical insight** are what distinguishes the A grade from the B.

Grade B (70-74):

Is familiar with the relevant ideas in the reading material and is able to apply and evaluate them. The argument and analysis are developed comprehensively using the available information correctly. Provides illustrative examples applying ideas and concepts appropriately. The answer is logically structured, well written and clearly presented.

Grade C (60-69):

Shows a fair understanding of the relevant body of knowledge, but the application of knowledge is either not fully developed or more of a “textbook” nature. Thus, the scope and limitations of particular ideas are not fully recognised, and the available evidence is not fully exploited. The argument displays a certain logic and is properly presented.

Grade D (50-59):

This is the minimum effective level - i.e. the mistakes are forgivable. The comments for “C” apply, but with one or two definite gaps - e.g.: Not more than one, or at the most two of the following: listed apparently trivial issues alongside important ones; OR made use of ideas and concepts which do not apply, OR misused the correct ideas and concepts; OR came up with a response which is not well justified and seems to contradict the learning materials or the models referred to.

FAIL (below 50%):

Does not understand the concepts and ideas discussed and its application to relevant problems or decisions. Insufficient mastery of relevant learning materials. Comprehension is not demonstrated - e.g.: basic ideas are incorrectly represented and explained; concepts are misrepresented. The answer is illogical. Irrelevant points are included and given as much weight as relevant ones.

BELOW 35%:

All of the points referred to under “FAIL”, plus does not seem to have made an effort to come to grips with the question or do the background reading and practice of exercises.

Procedure for Addressing Marking Grievances

If a course participant is unhappy with an assignment mark, he/she should discuss this with the lecturer concerned within one week of the return of the assignment. If a course participant is still not happy with this, he/she may submit a written application for review to the relevant Convenor, stating clearly the reasons why he/she is concerned about the mark allocation. If the dispute has not been resolved at this stage, the claim should go to the Head of School for final resolution.

Learning Group Assignments

All assignments and exercises receive a list of written comments, which will enable course participants to learn from the assessment process and develop their skills.

Course participants may feel that some members of their learning group have not contributed equally to the assignment. The group mark is allocated proportionally to each individual based on the group's evaluation of each member's contribution. The following criteria apply:

Learning Group Participation Criteria (to be used for each group member)

Criteria:	Weighting
1. Attendance and participation in meetings: <ul style="list-style-type: none"> • Arrive on time and leave on time • Let other members know if you are not going to be there • Explore other options for meeting or work required if unable to attend • Send promised work anyway • Have a considered and voiced opinion • Allow others to have an opinion 	20
2. Complete preparation as agreed on time.	20
3. Complete written work as per university requirements.	20
4. Meet all agreed deadlines.	20
5. Participate in the integration of the assignment.	20

Course participants should always clarify the criteria on which they will be evaluated with the relevant lecturer prior to the evaluation. The following is a guideline used by lecturers, although many will adapt it to their needs.

1. Presentation, style and language - format, writing style, referencing, etc.	10
2. Structure - clarity of purpose, flow and internal consistency	10
3. Analysis, understanding of problem/question and logic of argument	20
4. Evidence of reading, theory and background	20
5. Relevant detail and coverage of key issues	20
6. Conclusion/recommendation/findings	10
7. Creativity and overall impression	10
Total mark	100

EXAMINATIONS

The exam procedures outlined below are formal regulations of the University and Faculty. Examinations are set to reflect the challenges of the course, and should test the course participant's ability to integrate different ideas and express these in the form of a coherent presentation. Examinations may take a variety of forms besides the traditional closed book exam. Some of these different forms are discussed below.

Take home examinations or exam equivalent assignments

These are examinations where you take the question home, write it and return it by a set date and time.

- Examiners expect greater attention to style, spelling and the quality of writing when you have had time to do a draft first, spell check and check your referencing. Your submission must reflect this. Check the Assignment Style Guide for guidance.
- Take home examinations or exam equivalent assignments are treated exactly the same as examinations written under traditional exam conditions. This means that if you do not submit on time and you have not applied for a deferred examination ahead of time, you will be failed absent from the course.

If you plagiarise, copy or in any other way behave dishonestly the matter will be referred to the university legal office and you may be expelled from the short course.

Assessment of examinations

The university marking structure outlined above is used to mark exams.

Mark Allocation

The Faculty rules state that exams must constitute **a minimum of 50%** of the overall course mark and must be an individual exam.

Satisfactory Progress

Please note the following important Rules.

- If a course participant obtains 34% or less in any individual course his/her registration shall, save by the permission of the Dean, be cancelled. This mark is made up of the combined course work and examination marks. This means that you cannot continue with your course. In exceptional circumstances appeals can be made to the Dean.
- A course participant will not be granted credit in a course unless he/she obtains a mark of at least 35% in the written examination or its equivalent, even if he/she obtains an overall mark for that course of 50% or more. If you get less than 35% for an examination for a course you will fail that course.

University Policy on Examinations Procedure

Course participants who are disappointed with their marks are encouraged to discuss their dissatisfaction with the lecturer concerned. Lecturers may explain to the course participant concerned how their performance was assessed, and where their strengths and weaknesses were.

The External Examiner

In order to ensure uniformity of marking and accuracy in the addition of marks, an external examiner is appointed for every course. The role of the external examiner is to see that the examination questions asked are reasonable, that marking is fair, accurate and consistent, and to check that the total mark is correct. External examiners are required to look especially at borderline cases, not only between pass and fail, but also between classes of pass.

The decision of the external examiner will be published as **FINAL RESULTS**.

Dishonest Practices in Exams

Any apparent incident of cheating in an exam (including take-home exams) must be reported to the Dean who will initiate the process for a disciplinary hearing. Cheating in an exam (take home or written under exam conditions) is a serious breach of the University rules, which can result in credit for a course being withdrawn and exclusion from the University.

Assignment Style Guide

This section outlines Wits' expectations in terms of written work for assignments.

WRITING LESSON PLANS AND ASSIGNMENTS

Think of your audience: Whom are you writing for? What aspects need to be covered? What does not need to be covered? Remember that if you are being assessed, your assessor will want to know if you know the material you are writing about.

Research your topic: Read the relevant literature, download and use the relevant apps and applets, watch relevant YouTube videos, and use other available material.

Make a rough draft using headings: Write down ideas you think you need to cover. Use headings and list ideas under each heading. Use headings in your final draft. They help to keep you as the writer focused and they help your reader to follow your thinking.

Go for readability: Your aim is to help your reader understand the content of your assignment easily. Present information in an easy to understand sequence and in easily digestible sections. Reading your work should not be a daunting task.

Stick to the subject: Don't add in extra information to show how much you have researched. It must fit in with your argument. **Know your facts well enough to feel confident about your message:** Be specific. Write about specific situations, images and data. Be accurate. If a reader spots one inaccuracy, he or she will question the whole assignment.

Tips on organizing your material:

Post-it notes: Write your ideas onto post-it notes. You can rearrange them into the sequence you want.

Headings: Headings give the reader a quick overview of the lesson plan, report, memo or assignment.

Basic Structure

The following is a useful guide for structuring assignments.

Title Page: Include the assignment title, your name, the course name, the lecturer's name, and the date.

Contents Page (only if necessary): Include the main headings from your assignment with their page numbers. (You can use the index and tables function to create and generate a table of contents).

Introduction: Interpret the topic in your own words. Outline your central argument(s) or how you intend to tackle the task that has been asked of you. Outline the structure of your assignment. Try not to use jargon and explain it when you do. Be logical and concise. Your introduction could be half to one page.

Body: Define the key concepts used. Structure your writing in a logical way (perhaps use a mind map). Consult as many readings as necessary. Use examples or explanations to justify your reasoning. One paragraph should equal one main idea. Use your own words unless quoting. Include only relevant information. Assume that the reader knows the basics of your topic.

Conclusion: Summarise the main arguments. Conclude the assignment by asserting that you have done what you set out to do in the introduction. Create a sense of completion.

References: Reference all the books and articles you referred to in your assignment. Please use the APA (American Psychological Association) Style Guide, noting that the free online tutorial and the APA style blog are available at www.apastyle.org

Presentation: Written assignments, including reports, memos and lesson plans should be typed as this makes it easier for the marker to read and looks professional.

Some Common Weaknesses

The question is not answered. The writer has often not checked what is required or poorly analysed the topic. Lecturers go through assignment requirements in class with course participants. This is your opportunity to check that you understand what is required. If you aren't there when this is discussed it is your responsibility to find out from peers what is expected.

No reasons are given. There are a series of points or ideas but these are not supported by reasons. The reader is left to guess what the reasons are.

The **reasons are not communicated clearly.**

The assignment is and **looks like a first draft.** It is a series of ideas put together at the last minute and is poorly written, badly argued and poorly edited.

The assignment is a **repetition of the lecturer's notes.** There is little evidence of reading and integration of that reading into the assignment.

Parts of the assignment have been **plagiarised** and sources have not been accurately referenced. Please read the section on plagiarism carefully.

Writing Checklist

Structure:

- Have I included a front page with all the required information?
- Does my introduction clearly outline the structure of my assignment/report?
- Does the body of my assignment clearly raise the main issues that were set out in the Introduction?

- Does my conclusion adequately summarise and conclude the main issues raised in the body of the assignment?
- Have I included a reference list?

Content:

- Have I addressed the relevant aspects of the topic?
- Have I adopted a critical or analytical approach?
- Have I avoided jargon?
- Have I used examples to illustrate what I mean?
- Are my sentences short, logical and concise?
- Have I referenced properly (quotations and paraphrasing)?

Argument:

- Are my arguments well developed and sufficiently justified?
- Are my arguments well structured?
- Do my ideas and paragraphs flow logically?

Appearance:

- Does my report/ assignment look like a professional piece of work?
- Have I made a duplicate electronic copy of the final draft of my assignment and put it in a safe place in case my assignment goes missing or I am asked to make changes?

Rules and Requirements for Study

COURSE STRUCTURE

Attendance at lectures is compulsory.

Each course participant will be assigned to a Learning Group. The work done in learning groups forms a vital component of the learning process. Attendance at all learning group meetings is required. Learning group meetings between 20 March and 8 June will be organised by members at a time and place suitable to them.

Individual and learning group assignments will be set during the course and these must be completed and submitted to the course convenor by the date specified. All assignments must show the course participant(s) number and name (or Learning Group name), title of the assignment and the lecturer's name.

Course participants will be asked to complete an assessment of lecturers and the course. This assessment is intended to assist the course convenor in maintaining and improving the course's quality and all constructive comments and suggestions will be welcomed. All course participants are required to complete and submit the evaluation form.

EXAMINATIONS AND RESULTS

Timing and Type

The examination assignment will be conducted after each of the two course weeks. The same exam rules apply for ALL forms of examination with regard to submission and deferred exams. Examinations for this course will take the form of individual exam equivalent assignments.

Allocation of marks

The Faculty Board (Faculty of Humanities) may decide that the final mark in a course be made up of a combination of an examination mark together with marks obtained by a course participant in any test or task, essay, project, field work, group work or other assignments of the class. The proportion of marks to be allocated in each case is determined by the Faculty Board before the commencement of each course and is published in the course pack handed out to course participants before the commencement of the course.

In the case of learning group assignments, the learning group may choose to award the overall assignment mark differentially between learning group members according to their contribution to the assignment. Documentation outlining the implementation of this procedure is available in this study guide.

Publication of examination results

All results will be made available by email. Until marks are officially published by Wits University, they remain provisional and may be subject to change. Once marks have been published, they are official and can only be changed on written appeal to the Course Convenor.

The following codes shall apply to publication of course results:

Grade A	75% and above
Grade B	70-74%
Grade C	60-69%
Grade D	50-59%
FAIL	0-49%

SATISFACTORY PROGRESS

If a course participant obtains 34% or less in any course examination, his/her participation in the short course shall be cancelled.

A course participant will not be granted credit in a course unless he/she obtains a mark of at least 35% in the written examination or its equivalent, even if he/she obtains an overall mark for that course of 50% or more.

OVERALL RESULT

When a course participant has completed all the requirements for the certificate his/her results will be sent by email. Completion of all required modules for a short course will be included in the letter of provisional results.

SUCCESSFUL COMPLETION OF THE COURSE

In order to successfully complete the course, a course participant must satisfy the following requirements:

- Attendance and participation at lecture sessions and in learning group work.
- Completion of all assignments for each of the modules.
- Achievement of at least 50% in all the examinations.
- Achievement of an average mark of at least 50% for all modules.

The Dean of the Faculty of Humanities may suspend or cancel the registration of a course participant whose progress is considered to be unsatisfactory.

FEEES

For this short course, the course fees will be paid by the SBIDZ Licensing Company. The fees must be paid before the course participants can be provided with provisional results.

In the event of de-registration or cancellation, the participant must submit a written letter to the Course Convenor before or during the first week of the course.

ASSIGNMENTS AND EXAMS

Assignments and exams must be handed in at the time and date specified in this course outline and study guide. For every week an assignment is late, **5%** will be deducted. If submitted one month after the due date, **20%** will be deducted from the assignment mark. Assignments **will not** be accepted, if submitted later than one month after the due date.

Any person suspected of copying or plagiarising, will be handed back their assignment unmarked. Course participants are warned that they will be penalised if they copy.

Under no circumstances will an incorrect interpretation of exam assignment submission dates and times be considered a reason for admittance to a deferred examination.

In an instance of absence / illness, a letter from your superior, or a certificate from your doctor, must be submitted to the course convenor concerned.

5

Appendices

The following appendices are to assist you to work within the framework and requirements of the course. The intention is to make the learning process as smooth as possible to enable you to focus on building your skills and capacities.

A

A. Learning Contract

I, the undersigned, appreciate that the course organisers and facilitators will, to the best of their ability provide the learning environment, course material and expertise for a rewarding learning process to take place.

I agree that this alone will not ensure that a dynamic learning process occurs, and I therefore accept responsibility for my own learning and development.

I therefore agree to:

- Recognise and abide by the Rules and Requirements for Study with regard to the COURSE
- Accept group assignments, and individual assignment examinations as compulsory forms of assessment with regard to this course.
- Participate actively and constructively in all classes and learning group discussions.
- Take responsibility for the success of the learning group I am allocated to.
- Be open and honest in my communication with other course participants and lecturers.
- Attend all course activities.

B

Appendix B: Assignment Submission

B. Assignment Submission Procedure

PROCEDURE TO BE FOLLOWED WHEN EMAILING

We are very happy to receive assignments via email, however to ensure that your assignment is received, downloaded and recorded correctly, the following procedure **MUST BE FOLLOWED**:

1. **Subject** field in email address must be as follows:

Your surname: **Mata**
Lecturer's Name: **LAMPEN**

Therefore the subject line would look like this: **Mata LAMPEN**

2. EMAIL ADDRESS TO USE FOR ALL ASSIGNMENTS and requests for extension: nokhanyo.yolwa@wits.ac.za and nokhanyo.yolwa@gmail.com At no time should an assignment be sent to a lecturer.
3. Please **DO NOT PHONE** to check whether your assignment has been received. Nokhanyo Yolwa, the course administrator will confirm receipt.
4. A **FRONT PAGE** as per the examples provided **MUST** appear at the beginning of your email. Please do not send us the body of your assignment without this information.
5. Please do not send your front page and body of assignment separately. Your assignment must be in **ONE DOCUMENT**.
6. If you need to request an extension for an assignment, please EMAIL your request to Nokhanyo Yolwa, the course administrator. This request will be responded to immediately. **Extensions are only approved in extreme cases.**

C. Deferred Examinations Policy

GENERAL PRINCIPLES

1. The assignments for this course are considered to be examinations.
2. Deferred examinations are not a right and will only be granted in exceptional circumstances.
3. Wits may only grant deferred examinations in circumstances when the course participant is prevented from submitting the work by the original examination date by factors outside his/her control and where a formal, written request has been submitted.
4. Course participants are notified of the dates for examination assignment submissions at the beginning of each course and must commit to these dates.
5. No one other than the Course Convenor is empowered to agree to a deferred examination. Verbal, written or electronically mailed comments from other academic or administrative staff have no authority in this area.

FACTORS BEYOND THE CONTROL OF THE COURSE PARTICIPANT

The Course Convenor may grant a deferred examination on one of the following grounds: Severe illness attested to in writing by a qualified medical practitioner. Such certification of illness must be based on a diagnosis on or before the date of the original examination. It should be noted that:

1. **Minor illnesses during which people normally would be expected to perform their day-to-day duties are not acceptable.**
2. Post-dated evidence of the form “the patient tells me that he/she was ill on the date of the examination” is not acceptable, nor is any post-illness diagnosis by a practitioner after the date of the original examination.

ADDITIONAL FACTORS

1. Misreading or not diarising the dates of examinations is **not** a valid reason for the granting of a deferred examination.
2. If an application for a deferred is not granted, the course participant will be failed absent from the original examination, will be given a zero mark and, according to the regulations for his/her short course, can have his/her registration cancelled.
3. At his/her discretion the Course Convenor may require the course participant to submit himself/herself for a deferred examination within a reasonable time period.

D

D. Assignment Cover Pages

GROUP ASSIGNMENTS

NAME OF COURSE: Professional Practice: Applications of Dynamic Software for Secondary Mathematics Teachers

LECTURER: Dr Erna Lampen

ASSIGNMENT TITLE: (Provide an interesting title)

ASSIGNMENT HAND IN DATE: 30 March 2020

GROUP NUMBER/NAME: Number 1 (or an interesting group name)

GROUP MEMBERS: J Bloggs
A Mathoma
V Xaba

INDIVIDUAL ASSIGNMENTS

NAME OF COURSE: Professional Practice: Applications of Dynamic Software for Secondary Mathematics Teachers

LECTURER: Dr Erna Lampen

ASSIGNMENT TITLE: (Provide an interesting title)

ASSIGNMENT HAND IN DATE: 25 May 2020

COURSE PARTICIPANT NAME: Jo Bloggs