FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

1. Executive Dean's Welcome Message

The Faculty of Science and Technology Education was established in 2014. The Faculty has three Departments, namely, (i) Art, Design and Technology Education (ii) Science, Mathematics and Technology Education (iii) Technical and Engineering Education and Training. The Faculty seeks to add value to the Heritage-based education 5.0 philosophy by training a graduate that can craft context-based solutions to community problems nationally and internationally. This is achieved through offering world-class programmes in identified areas of Science, Technology, Engineering and Mathematics (STEM), and Design education. The Faculty aims to prepare quality practitioners, educators and professionals for the secondary schools and higher education institutions, suitable for serving in a wide variety of environments for teaching, training and skills development. The master's and doctoral programmes offered in the faculty prepare a graduate pertinent to addressing the community needs of the 21st century.

2. Executive Dean's Profile

Lwazi Sibanda, is the Executive Dean and Associate Professor in the Faculty of Science and Technology Education. She holds Doctor of Philosophy in Education from University of Fort Hare, South Africa. Her other qualifications include Master of Education in Educational Management from Midlands State University, Bachelor of Education in Educational Administration, Planning and Policy Studies and Diploma in Education from University of Zimbabwe. She specialised in Education Management and is involved in teacher education. She teaches education courses (modules) to undergraduate and postgraduate students. She supervises undergraduate research projects and postgraduate dissertations and theses at Master's and Doctoral levels. Her research interest is on education management, leadership and supervision, inclusive education, teacher education, curriculum design and implementation, assessment, quality and equity in education, guidance and counselling, classroom management, positive discipline, transformative pedagogy and improving instructional delivery in all levels of education. She is an external examiner for Master's and Doctoral theses from international

universities. She is also an external assessor for Academic Staff Promotions for international universities. She has published quite a number of journal articles and book chapters individually and collaboratively including book editing. Prof Sibanda has also presented conference papers locally and internationally. She is a member of the journal editorial board and has reviewed various manuscripts from a number of journals and book chapters from international publishers. As part of community engagement, Prof Sibanda is a member of various university committees. Prof Sibanda also works with various public institutions and Non-Governmental Organisations as part of her community engagement. She is an institutional focal person for UNESCO-Capacity Building Programme for Teacher Educators on Education for Sustainable Development (CAP-ESD). She is also a member of Education Coalition of Zimbabwe (ECOZ) (Matabeleland North Chapter). Prof Sibanda is a member of International Institute of Chartered Educational Practitioners (IICEP). She is a ZIMCHE Peer Reviewer for Academic and Institutional Audits, and has been a team leader. She has been awarded certificates of excellence in reviewing research activities and participation in conferences; certificate by UNESCO in collaboration with Rhodes University for Education for Sustainable Development Leadership and Practice in Teacher Education and membership certificate for International Institute of Chartered Educational Practitioners. Her contact email address is: lwazi.sibanda@nust.ac.zw

3. Vision

The broad aspiration of the Faculty of Science and Technology Education, as encapsulated in National University of Science and Technology's vision is: To be a world class Faculty in science, technology, engineering, innovation, entrepreneurship, spearheading industrialisation locally and beyond.

4. Mission Statement

The Faculty of Science and Technology Education's fundamental purpose and reason for existence as outlined in National University of Science and Technology's mission statement is: To lead in human capital development for industrial and socio-economic transformation, with a bias towards science, technology, engineering and mathematics (STEM) based solutions.

5. Core Values

In pursuance of its vision and mission, the Faculty of Science and Technology Education is guided by National University of Science and Technology's following principles:

- Integrity and Honesty
- Responsibility
- Mutual respect and Teamwork
- Passion

6. Our Faculty in Numbers

Share Faculty statistics on:

- ✓ Undergraduate students
- ✓ Postgraduate students
- ✓ Research Articles Published in 2022 (books + book chapters + journal articles) **25**
- ✓ Academic staff**: 27**
- ✓ Undergraduate Programmes
- ✓ Postgraduate programmes

7. Departments

Department of Art Design and Technology Education

Programmes

- ✓ Bachelor of Design and Technology Education Honours Degree in Applied Art and Design
- ✓ Bachelor of Design and Technology Education Honours Degree in Design and Technology
- ✓ Bachelor of Design and Technology Education Honours Degree in Clothing, Textile and Fashion Design
- ✓ Master of Technology Education Degree in Applied Art and Design
- ✓ Master of Technology Education Degree in Clothing, Textile and Fashion Design
- ✓ Master of Technology Education Degree in Design and Technology.

Department of Science Mathematics and Technology Education

Programmes

- ✓ Bachelor of Science Education Honours Degree in Accounting and Business Studies
- ✓ Bachelor of Science Education Honours Degree in Biology
- ✓ Bachelor of Science Education Honours Degree in Chemistry
- ✓ Bachelor of Science Education Honours Degree in Computer Science
- ✓ Bachelor of Science Education Honours Degree in Mathematics
- ✓ Bachelor of Science Education Honours Degree in Physics
- ✓ Master of Science Education Degree in Accounting and Business Studies
- ✓ Master of Science Education Degree in Biology
- ✓ Master of Science Education Degree in Chemistry
- ✓ Master of Science Education Degree in Computer Science
- ✓ Master of Science Education Degree in Mathematics
- ✓ Master of Science Education Degree in Physics
- ✓ Postgraduate Diploma in Science and Technology Education

Department of Technical and Engineering Education and Training

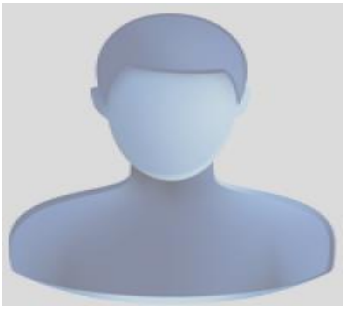
Programmes

- ✓ Bachelor of Technology Education Honours Degree in Civil and Construction Engineering
- ✓ Bachelor of Technology Education Honours Degree in Electrical and Electronic Engineering
- ✓ Bachelor of Technology Education Honours Degree in Mechanical and Industrial Engineering
- ✓ Bachelor of Technology Education Honours Degree in Wood Science and Technology.
- ✓ Bachelor of Technology Education Honours Degree in Technical Graphics
- ✓ Master of Technology Education Degree in Civil and Construction Engineering
- ✓ Master of Technology Education Degree in Electrical and Electronic Engineering
- ✓ Master of Technology Education Degree in Mechanical and Industrial Engineering
- ✓ Master of Technology Education Degree in Wood Science and Technology
- ✓ Postgraduate Diploma in Tertiary and Higher Education

8. Latest News

One of our Department Chairpersons, Dr Elphina Mhlanga is currently in Philippines, under the World Food Programme, conducting workshops on training of trainers and facilitators to community based participatory planning programmes and Seasonal Livelihoods Programming.

9. Faculty Staff



Executive Dean Professor Lwazi Sibanda

Prof Lwazi Sibanda, Executive Dean, PhD in Education, Master of Education in Educational Management, Bachelor of Education in Educational Administration, Planning and Policy Studies and Diploma in Education. lwazi.sibanda@nust.ac.zw

Publications

Published papers

1. Chikusvura, N., **Sibanda, L.** & Mathwasa, J. (2021). The Competence-Based Advanced Level Mathematics Curriculum: Implications for Students' Enrolment in one University in Zimbabwe. *Randwick International of Education and Linguistics Science (RIELS) Journal,* 2(1), 8-19. http://www.randwickresearch.com/index.php/rielsj
2. Chikusvura, N., Nkomo, S. & Sibanda, L. (2022). Transition to Virtual Graduation: Experiences of 2021 University Graduates in Zimbabwe. *Randwick International of Education and Linguistics Science (RIELS) Journal,* 3(3), 497-503. *http://www.randwickresearch.com/index.php/rielsj*
3. Manokore K, **Sibanda L.,** Shava G., Mangena A, Muzari T, Sibanda Z. and Mkwelie N. (2023) Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe, *British Journal of Multidisciplinary and Advanced Studies*: English Lang., Teaching, Literature, Linguistics & Communication, 4(5),1-20.
4. Mathwasa, J. & **Sibanda, L.** (2020). Constraints Affecting Men's Participation in Early Childhood Education (ECE): Implications for Intervention. *Journal of Social Sciences and Humanities,* 17(4), 188-203. http://ejournal.ukm.my/ebangi/article/viewFile/40218/10590
5. Midzi, S.**, Sibanda, L.** & Mathwasa, J. (2021). Provision of Quality Education in Private Schools: Reflective Practices in Low-Cost Private Secondary Schools in Bulawayo Metropolitan Province. *European Journal of Social Sciences Studies,* 6(2), 142-162. https://oapub.org/soc/index.php/EJSSS/article/download/1016/1602
6. **Mlalazi, L.** (2015). *Implementation of Strategies Used to Maintain Positive Discipline in Secondary Schools in Bulawayo Metropolitan Province, Zimbabwe: Towards A Holistic Positive Discipline Management Model* libdspace.ufh.ac.za/.../LWAZI%20FINAL%20COPY%20EDITED%20MAY%202015.. .
7. **Mlalazi, L.,** Rembe, S. & Shumba, J. (2016). Implementation of Guidance and Counselling as a Positive Discipline Management Strategy in Bulawayo Metropolitan Province Secondary Schools. *Journal of Social Sciences,* 47(3), 191-205. https://www.tandfonline.com/doi/abs/10.1080/09718923.2016.11893559
8. **Mlalazi, L**., Rembe, S. & Shumba, J. (2016). Implementation of Code of Conduct as a Positive Discipline Management Strategy in Bulawayo Metropolitan Province Secondary Schools. *International Journal of Educational Sciences,* 15 (3), 444-460. https://www.tandfonline.com/doi/abs/10.1080/09751122.2016.11890555

9. Moyo, C, & **Sibanda, L.** (2018). An assessment of strategies that enhance the teaching and learning of Business Studies at Advanced Level in Imbizo District of Bulawayo Metropolitan Province. *Journal of Education and Practice,* 9(30),108-118. https://www.iiste.org/journals/index.php/JEP/article/view/44699

10. Moyo, M. & **Sibanda, L.** (2023). Teachers and Learners' Experiences of Implementing Blended Learning During COVID-19 Pandemic Lockdown in Mangwe District, Zimbabwe. *International Journal of Education Humanities and Social Science,* 6(3), 106-117.

11. Mwangu, E. C. & Sibanda, L. (2017). Teaching Biology practical lessons in secondary schools: A case study of five Mzilikazi District Secondary Schools in Bulawayo Metropolitan Province, Zimbabwe. *Academic Journal of Interdisciplinary Studies,* 6(3):47-55. https://content.sciendo.com/view/journals/ajis/6/3/article.p47.xml

12. Nani, G. V. & **Sibanda, L.** (2019). Choice of Practical Subjects: Is It Still a Gendered Phenomenon? A Case of Selected Co-educational Secondary Schools in Bulawayo Metropolitan Province, Zimbabwe. *Journal of Educational and Social Research,* 9(3),1-10. http://content.sciendo.com>journals>jesr>9>3>jesr.9.issue-3.xml

13. Nani, G. V. & **Sibanda, L.** (2020). Online Home Schooling: Are Parents Ready? Lessons from the Corona Virus Disease Induced Lock Down. *Randwick International of Education and Linguistics Science (RIELS) Journal,* 1(2), 140-151. http://www.randwickresearch.com/index.php/rielsj

14. Ncube, P. & **Sibanda, L.** (2018). Implementing Science, Technology, Engineering and Mathematics Education: A case of four Single Sex Secondary Schools in Bulawayo Metropolitan Province, Zimbabwe. *Journal of Education and Practice,* 9(32),1-11. https://www.iiste.org/journals/index.php/JEP/issue/view/3764

15. Ndhlovu, J., **Sibanda, L.,** & Mathwasa, J. (2020). Influential Factors to Financial Management in Chegutu District Secondary Schools of Mashonaland West Province, Zimbabwe. *Randwick International of Education and Linguistics Science (RIELS) Journal,* 1(3), 330-340. http://www.randwickresearch.com/index.php/rielsj

16. Shava, G. N. & **Sibanda, L.** (2020). Effects of School Leadership in Enhancing Learners' Achievement in South African Rural Schools. *Journal of Educational Research in Developing Areas (JEREDA),* 1(3). 202-213.

17. Sibanda, L. & Mpofu, M. (2017). Positive Discipline Practices in Schools: A Case of Mzilikazi District Secondary Schools in Zimbabwe. *Journal of Educational and Social*

Research, 7(3), 117-125. https://content.sciendo.com/downloadpdf/journals/jesr/7/3/article-p117.xml

18. **Sibanda, L.** (2018). Teaching Social Skills as a Proactive Discipline Management Strategy: Experiences of Selected Secondary Schools in Bulawayo Metropolitan Province. *American Journal of Educational Research,* 6(12), 1636-1645. http://pubs.sciepub.com/education/6/12/8
19. **Sibanda, L.** (2021). Managing Learner Behaviour in a Virtual Classroom: Experiences of Selected Private High School Teachers in Bulawayo Metropolitan Province, Zimbabwe. *Journal of Education and Practice,* 12(6), 118-131. http://iiste.org/Journals/index.php/JEP
20. **Sibanda, L.** & Mathwasa, J. (2020). Modelling Positive Behaviour: A Vital Strategy in Instilling Positive Discipline Among Secondary School Learners. *Randwick International of Social Science Journal,* 1(2), 308-323. http://www.randwickresearch.com/index.php/rissj/article/view/56
21. **Sibanda, L.** & Mathwasa, J. (2020). Promoting Inclusivity Through Quality Assessment in Rural Secondary Schools. In: Adeyemo K. S. (eds), *The Education Systems of Africa. Global Education Systems* (pp. 1-18). *Springer, Cham.* https://doi.org/10.1007/978-3-030-43042-945-1
22. **Sibanda, L.** & Mathwasa, J. (2021). Perceptions of Teachers and Learners on the Impact of Covid-19 Pandemic Lockdown on Rural Secondary School Female Learners in Matobo District, Zimbabwe. *European Journal of Social Sciences Studies,* 6(3), 14-34. https://oapub.org/soc/index.php/EJSSS/article/download/1029/1615
23. **Sibanda, L.** & Nani, G. V. (2020). Feedback as an Assessment for Learning Tool in Higher Education: Experiences of Lecturers and Postgraduate Students at one selected State University in Zimbabwe. *Zimbabwe Journal of Educational Research,* 32(3), 364-382.
24. Sibanda Z. & **Sibanda L.** (2022). Quality Art and Design Education among Physically Challenged Ordinary Level Learners at a Special Education Secondary School in Zimbabwe, *British Journal of Multidisciplinary and Advanced Studies*: *Education, Learning, Training & Development,* 3(2),23-47.

Book Chapters

1. Mathwasa, J. & **Sibanda, L.** (2019). The Effect of Examination-Related Anxiety on Career Pathway for High School Graduates. In S. G. Taukeni, (Ed.), *Addressing Multicultural Needs in School Guidance and Counselling* (pp. 216-237). Hershey: IGI Global.
2. Mathwasa, J. & **Sibanda, L.** (2020). Enhancing Students' Self-Efficacy: Implication for High School Guidance and Counselling Educators. In S. G. Taukeni, (Ed.), *Counselling and Therapy* (pp. 1-21). London: IntechOpen. *DOI: http://dx.doi.org/10.5772/intechopen.90555.*
3. Mathwasa, J. & **Sibanda, L.** (2021). Male Educator Recruitment in Early Childhood Centres: Implications for Teacher Education. In U. Kayapinar, (Ed.), *Teacher Education* (pp. 1-17*)*. London: IntechOpen. https://www.intechopen.com/online-first/male-educator-recruitment-in-early-childhood-centres-implications-for-teacher-education
4. Mathwasa, J. & **Sibanda, L.** (2021). Inclusion in Early Childhood Development Settings: A Reality or an Oasis. DOI: 10.5772/intechopen.99105. Available from: https://www.intechopen.com/online-first/78141
5. **Sibanda, L.** (2023). Strategies for Achieving Equity-Based Education: Towards an Equitable Education System. In J. Chitiyo & Z. Pietrantoni, (Ed.), *Social Justice and Culturally-Affirming Education in K-12 Settings* (pp. 133-152). Hershey: IGI Global.
6. **Sibanda, L.** (2023). Reflections on Science, Mathematics, and Technology in Zimbabwe: Research, Policy and Practice. In Chirinda, B., **Sibanda, L.,** Vere, J. & Sunzuma, G. (Ed.) *Science, Mathematics, and Technology Education in Zimbabwe: Research, Policy and Practice* (pp. 287-293). New York: Peter Lang Publishing.
7. **Sibanda, L.** & Phuthi, N. (2023). Issue-Based Learning and Transformative Pedagogies. In UNESCO, (Ed.) *Education for Sustainability, CHANGE PROJECTS in Southern Africa: Working Towards Innovation and Change Together* (pp. 63-67). UNESCO Regional Office for Southern Africa. Available from: https://unesdoc.unesco.org/ark:/48223/pf0000387847

Edited Book

Chirinda, B., **Sibanda, L.,** Vere, J. & Sunzuma, G. (2023). *Science, Mathematics, and Technology Education in Zimbabwe: Research, Policy and Practice*. New York: Peter Lang Publishing.

Research Conferences Attended

1. Mangena, A. & **Sibanda, L.** (2021). *Lecturers' predicaments in using online platforms during COVID19 lockdown: A case of a university in Zimbabwe.* Paper presented at the 8th Annual Research Day at National University of Science and Technology in Bulawayo, 2 September, 2021.
2. Mangena, A. & **Sibanda, L**. (2021). *Encounters and challenges of using Information and Communication Technology for higher education academic staff during COVID 19 lockdown: A Case Study of a selected University in Zimbabwe.* Paper presented at the 1ST Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 11-13 August, 2021.
3. Mangena, A. & **Sibanda, L**. (2022). *E-Schools Community Engagement in Hwange District, Matabeleland North Province.* Paper presented at the 2nd Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 14-16 September, 2022.
4. Manokore, K. & **Sibanda, L.** (2023). National STEM Education Framework: Teachers' Perspectives on the 2015-2022 Curriculum Cycle. Paper presented at the 3rd Blended Conference on Education for Sustainable Development Interdisciplinary Research at National University of Science and Technology in Bulawayo, 18-20 October, 2023.
5. Matsa, W., **Sibanda, L**. & Chitanana, L. (2021). *Technological Driven Pedagogies in the Face of COVID 19 Lockdown: A Threat to Zimbabwean State Universities' Achievement of Sustainable Development Goal 4 on Inclusive and Equitable Quality Education.* Paper presented at the 1ST Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 11-13 August, 2021.
6. Mhlanga, H. T. & **Sibanda, L.** (2013). *An assessment of factors contributing to indiscipline among ordinary level learners in Zimbabwean Peri-urban Secondary Schools: A case study of one secondary school in Umguza District.* Paper presented at the 40th Annual International Conference of the Southern African Society for Education (SASE), North West University, Mafeking Campus, 26-28 September, 2013.
7. Mudzengerere, G., Phuthi, N. & **Sibanda, L.** (2022). *Improving the teaching of Art and Design using information technologies*. Paper presented at the 2nd Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 14-16 September, 2022.
8. Mwangu, E. C. & **Sibanda, L**. (2016). *Perceptions of teachers in teaching Biology practical lessons at Ordinary Level in Mzilikazi District Secondary Schools of Bulawayo Metropolitan Province, Zimbabwe.* Paper presented at the South Africa International Conference on Education (SAICEd), Manhattan Hotel in Pretoria, 19-21 September, 2016.
9. Phuthi, N., **Sibanda, L.,** Mpofu, M. & Mangena, A. (2021). *Institutional Manoeuvres Towards Adoption and Sustainable Implementation of Online Distance Teaching and*

Learning. Paper presented at the 1ST Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 11-13 August, 2021.

10. Shava, G., Dlodlo, M. & **Sibanda, L.** (2015). *Challenges Women in School Leadership Positions: Experiences from Schools in Zimbabwe.* Paper presented at Edu-Lead Research Group International Conference, North West University, Potchefstroom Campus, South Africa, 13-15 April, 2015.
11. **Sibanda, L.** (2016). *Implementation of Early Childhood Development Policy in Zimbabwe: A case study of Mzilikazi District Primary Schools in Bulawayo Metropolitan Province.* Paper presented at the South Africa International Conference on Education (SAICEd), Manhattan Hotel in Pretoria, 19-21 September, 2016.
12. **Sibanda, L.** (2016). *Implementation of positive discipline management strategies in Bulawayo Metropolitan Province, Zimbabwe: A case of secondary schools.* Paper presented at the 43rd Annual International Conference of the Southern African Society for Education (SASE), University of Zululand in Durban, Premier Hotel, Richards Bay, 28-30 September, 2016.
13. **Sibanda, L.** (2017). *Implementation of Early Childhood Development Policy in Zimbabwe: A case study of Mzilikazi District Primary Schools in Bulawayo Metropolitan Province.* Paper presented at the 5th Annual Research Day at National University of Science and Technology in Bulawayo, 27-28 July, 2017.
14. **Sibanda, L.** (2018). *Assessment for Learning in Higher Education: Experiences of one University in Zimbabwe.* Paper presented at the 45th International Conference of the Southern African Society for Education (SASE), Cape Peninsula University of Technology in Cape Town, Lagoon Beach Hotel, 03-05 October, 2018.
15. **Sibanda, L.** (2019). *Assessment for Learning in Higher Education: Experiences of one University in Zimbabwe.* Paper presented at the 7th Annual Research Day at National University of Science and Technology in Bulawayo, 20-21 June, 2019.
16. **Sibanda, L.** & Nani, G. V. (2019). *Feedback as an Assessment for Learning Tool in Higher Education: Perceptions of Lecturers and Postgraduate Students in one University in Zimbabwe.* Paper presented at the 9th Annual Teacher Education and Interdisciplinary Research Conference (TEIR), UNISA, in Victoria Falls, Elephant Hills Hotel, Zimbabwe, 07-10 October, 2019.

Assistant Registrar

Ms Siyanalole Kalenge

Ms S Kalenge, Assistant Registrar, MSc in Marketing, Postgraduate Diploma in Public Relations – (NUST, Zimbabwe), Bachelor of Commerce in Business Management, (MSU), Zimbabwe).

siyanalole.kalenge@nust.ac.zw

Chief Secretary

Miss Modester Moyo

Ms M Moyo, Chief Secretary, Bachelor of Commerce in Management, (NUST, Zimbabwe), HND Office Management, Diploma in Management.

modester.moyo@nust.ac.zw

Faculty Technician (ICTS)

Mr Banele Mpande

Mr B Mpande, ICTS Technician, Bachelor of Business Management and Information Technology (CUZ)

banele.mpande@nust.ac.zw

FIRST DEPARTMENT

DEPARTMENT OF ART DESIGN AND TECHNOLOGY EDUCATION

BACKGROUND

In line with 5.0 ideology that calls for education that delivers products, the Art, Design and Technology Education department thrusts innovation, industrialisation at the centre stage of its programmes. Design is a broad and growing field of professional practices in Zimbabwe and abroad. A qualification in Art, Design and Technology Education is an ideal fit if you are looking for a career in education that allows you to teach creative Arts, effectively or take the route to step out of the classroom into design and manufacturing. It was on this score that the Department of Art, Design and Technology Education was established in 2014 to cater for those who want to be innovative and creative in the field of education and beyond in Zimbabwe internationally. The department is multidisciplinary as it includes Applied Art and Design, Clothing, Textiles and Fashion Design and Design and Technology and exposes students to conduits that drive entrepreneurship. Our multidisciplinary programmes prepare students to be effective teachers in their preferred professional trails in the design field.

VISION

Stirring creativity, shaping innovation and fostering excellence in Art, Design and Technology.

MISSION

The department embraces the intersection of Art, Design and Technology Education and seeks to be a vibrant centre of creativity, innovation and promotion of partnership through contemporary integrative approaches of education and industrialisation.

WHY STUDY WITH US

Our department offers numerous benefits designed to support both local and international students seeking to pursue a career in Art, Design and Technology Education. These include:

- Equipping design students with scientific knowledge and technical skills that empower them to be able to operationalise various programmes in the creative Arts.
- Providing a conducive teaching and learning environment for skilling upcoming design oriented students.

- Marshalling a highly qualified team with various areas of expertise relevant to Art, Design and Technology Education.
- Provision of laboratory facilities with modern equipment.
- Enabling high-quality research of national, regional and increasingly international standing.
- Offering a strong network of local and national stakeholders, including industry, government, and the wider business community.

RESEARCH

Through its research activities, the department intends to build evidence base suitable for the development and implementation of Art, Design and Technology Education. The researchers and students in the department have published and are carrying out research in the following areas:

- ✓ Gender
- ✓ Design
- ✓ Innovation
- ✓ Education
- ✓ Sustainable Development Goals.
- ✓ Alignment of policy and implementation of programmes in education.

DEPARTMENT OF ART, DESIGN AND TECHNOLOGY EDUCATION

ZIMBABWE MINIMUM BODIES OF KNOWLEDGE AND SKILLS

A. UNDERGRADUATE PROGRAMMES (BDTech Ed) (Hon) 2 year programme

1. Bachelor of Design and Technology Education (Hons) Degree in Applied Art and Design
2. Bachelor of Design and Technology Education (Hons) Degree in Clothing, Textiles and Fashion Design
3. Bachelor of Design and Technology Education (Hons) Degree in Design and Technology

Name of ProgrammeBachelor of Design and Technology Education Honours Degree [BDTechEd (Hons)] in Applied Art and Design

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**
ZNQF Level	8

Normal Entry : Diploma in Education from accredited and recognized institution or equivalent, in the specified subjects; five 'O' Level passes including English Language and Mathematics.

Special Entry: N/A

Mature Entry: N/A

Other: (indicate): N/A

LEARNING OUTCOMES

Holders of the BDTechEd (Hons) Degree in Applied Art and Design will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Design and Technology curriculum

- Apply sound research and technological techniques when carrying out research.
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Design and Technology education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**ZIMCHE/NUST**	**Credits**
Level One: Semester One		
PST1112-ICT Applications in Education	ZIMCHE	12
PST1118-Culture and Heritage Studies	ZIMCHE	12
PST1163- Entrepreneurship and Financial Management	ZIMCHE	12
PDT 1120 History of Design	NUST	12
PDT1122-Design Media	ZIMCHE	12
PDT1127-Design Processes and Projects	ZIMCHE	12
Level One: Semester 2		
PST1204 Curriculum Development And Evaluation	NUST	12
PST 1211 Research Methods And Statistics	ZIMCHE	12
PDT1220-Drawing and Anthropometrics	ZIMCHE	12
PDT 1223 Set Designs	NUST	12
PDT1224-Graphic Design	ZIMCHE	12
PDT 1221 Design Analysis	ZIMCHE	12

Level Two: Semester 1		
PST1101-Theoretical Foundations in STEM Education	NUST	12
PST3000 Work Based Experience	NUST	12
PST 2105 Testing, Assessment And Evaluation	NUST	12
PDT2123-Visual Inquiry	ZIMCHE	12
PDT2125-Design Marketing	ZIMCHE	12
PDT2194-CAD Product Design	ZIMCHE	12
Level Two: Semester 2		
PDT2225 Advanced Pedagogies in Design and Technology Education	NUST	12
PST2308-Educational Management	ZIMCHE	12
PST2210-Final Year Research Project	ZIMCHE	24
PDT 2221 Design Enquiry	NUST	12
PDT 2323 Modelling and materials	NUST	12
PDT 2220 Design Project	NUST	12
MAXIMUM BOARD OF KNOWLEDGE CREDITS		**180**
TOTAL OF CREDITS FOR NUST FLAIR		**120**
GRAND TOTAL Of MKS CREDITS (100%)		**300**

MODULE SYNOPSES	
MODULE	**SYNOPSIS**
PST1112-ICT Applications in Education	This module seeks to equip students with skills of improving learning and teaching through the use of various instructional media that include audio visual communication. The module will also familiarise students with different computer software including Ms Word, Ms Excel, Ms Access, PowerPoint and the Publisher. Upon completion of the module students should be able to design and use instructional media, create data bases and tables, query information from tables, open/close files and directories, analyse students' performance using the Excel formulas and research from the internet.

PST1118-Culture and Heritage Studies	This module will introduce scholars to definition terms of culture and heritage. The module will expose the learners to issues like civic education, spirituality, tangible and nontangible Zimbabwean resources. History of Zimbabwe and its different ethnic groupings in different geographical locations. Learners would be challenged to be tolerant and enjoy the multicultural status of the nation.
PST1163-Entrepreneurship and Financial Management	The courses give basics on how business is managed from a small scale to high scales. The module will expose the learners to various businesses models and financial management systems that can be used to start and sustain business projects. Marketing strategies will also form part of this module.
PDT 1120 History of Design	A study of the origins of design during the 17^{th} and 18^{th} centuries, Industrial Revolution and after world Wars I and II. Beginning of Technology developments and now globalisation in development.
PDT1122-Design Media	The module highlights contemporary design practice. It is a project based module to offer students the opportunity to explore and experience with some of the visual effects of information communication technology; apply the design process in developing visual designs; define objectives, identify constraints through synthesis of design solutions, a presentation of designs using ICT; producing still and animated electronic designs; evaluation of design work and digital images in galleries, museums, electronic devices and other art and design centres.
PDT1127-Design Processes and Projects	Design process strategy in design; its application in identifying a need or opportunity leading to design brief, analysis, research, using research results in specifications. Generation and appraisal of design ideas. Modelling of ideas, Product development and planning. Realisation. Testing and evaluation.
PST1204 Curriculum Development and Evaluation	Curriculum terminology and concepts; ideology and philosophy underpinning curriculum planning, development and evaluation. Curriculum needs assessment models. The impact of social, economic, political, technological, psychological, philosophical and cultural, environmental influences on the curriculum. Process and product models of curriculum development; objectives models e.g. Tyler, Wheeler; decision-making models e.g. Scuffle beam (CIPP); Designing/developing, delivering and evaluating a curriculum. Curriculum change and innovation; strategies for change Varying modes of delivering the curriculum, including flexible, distance, open and resource-based learning, and independent study. Examples of curriculum projects in Zimbabwe and internationally.

	Concept maps and hierarchies, concept analysis. Roles of CRADU, CDU, RCZ, SIRDC.
PST 1211 Research Methods and Statistics	The module will introduce the learners to the basic principles of research. Qualitative and Quantitative approaches to research will be used. Mixed methods research approach will be introduced in this module. Research instruments will be explored to give the learners an appreciation of these instruments. Applications of descriptive and inferential statistics in education, Sampling theory, probability theory and distribution, the normal distribution, the binomial distribution, the Poisson distribution, applications of significance and hypothesis testing, *X2* test, *t-test, z-test.*
PDT1220-Drawing and Anthropometrics	Drawing through perception. Important basic drawing skills. Mark and image making. Principles and skills of drawing: observation, still life, analysis of drawings, Exploration of drawing techniques; pen and wash.
PDT 1223 Set Designs	The module looks at spatial designs and approaches in interior design, stage design and exhibitions; commissioned designs, major design projects: planning specific site designs, producing installations and designing environments.
PDT1224-Graphic Design	Nature and history of graphic Design, Computer graphics; 2-Dimensional and 3-Dimensional (2-D & 3-D) drawing in graphic design. Application of digital drawing and photography. Developing digital images, computer design software, tools in graphic design, Advertising designs and print media. Developing graphic products, magazines, packaging and posters. Software eg Corel draw, Publisher, Photoshop, and other software. Colour, texture and the human visual system.
PDT 1221 Design Analysis	The module is about analysing a design into: design brief, search and order information on a design problem. There is also an appraisal of situations with specific requirements taking into account human needs, aesthetic, technical and environmental factors. Students generate and explore ideas and concepts, evaluate ideas, selection and modelling of a design proposal develop a design proposal, design techniques, technology and technology processes as well as historical & contextual, cultural contexts relativity.

PST1101- Theoretical Foundations in STEM Education	Psychology of education- Physical, cognitive and emotional development in children, adolescents and adults. Piaget, Brunner, Pavlov, Vygotsky, etc. Individual differences and learning styles. Pedagogy and andragogy, memory and understanding. Sociology of education- Human Social Interactions; society and community; urban and rural communities, agents of socialization; culture and education, inclusive learning; industrialization; globalization, citizenship. Durkheim, Weber, Mead, etc. Philosophy of education– theory and practice; trends in philosophy of education, humanism, progressivism, reconstructionism, empiricism, modernism, structuralism, critical theory, hermeneutics, constructivism, phenomenology. Rousseau, Karl Marx, John Dewey, Vygotsky, etc.
PST3000 Work Based Experience	Students get attached to a school environment to acquire practical experience as they interact on a daily basis with the various educational stakeholders
PST 2105 Testing, Assessment And Evaluation	The purposes and methods of assessment; formal/informal; formative/summative; norm/criterion referenced; objective/subjective. Characteristics, strengths and weaknesses of a range of testing methods. Examinations: processing and administration; item writing; examination results grading systems; item analysis; examination boards: HEXCO, ZIMSEC, etc; standardized tests; continuous and terminal assessment; portfolio and project assessment; the effects of assessing learners and teachers; evaluation; selecting and using appropriate approaches and tools for evaluating the effectiveness of learning sessions and programmes; quality control techniques and accreditation; trade testing and competency-based testing.
PDT2123-Visual Inquiry	Visual Research: Concepts, Approaches, testing and evaluation of visual objects and images. Types of visual research. Research strategies in designing. Involving clients in designing. Visual research methodology.
PDT2125-Design Marketing	Combining design, creativity analytical skills. Carryout market research and develop new products. Study consumer behaviour in selling and advertising design products. Design management and the role of competition. Combining design skills, creative ability and analytical skills. Carry out market research and develop new products. Study consumer behaviour in selling and advertising design products. Design management and the role of competition in merchandizing; visual, retail merchandizing and their effects. Merchandising techniques. Sales, fashion shows, exhibition of designs. Textile Design and Fashion Marketing, Textile and fabric merchandizing, visual merchandizing, retail merchandizing and their effects.

	Merchandising techniques. Sales, fashion shows, exhibitions of textiles and fashion designs.
PDT2194-CAD Product Design	CAD includes ability to produce accurate designs, drawing in 2-D or 3-D and rotated. Deciding on units of measurements and using scale 1: 1scale. Developing speed in product design. Meeting targets, Application of aesthetics.
PDT2225 Advanced Pedagogies in Applied Art, Design and Technology	This course is designed to meet practical needs of in- service classroom Art and Design teachers. The purpose of the course is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology course on becoming Art and Design teachers. The course focuses upon classroom techniques, instructional procedures and languages, and teacher/learner interactions. Microteaching sessions focusing on teaching 'A' level Art and Design will be conducted. The teachers need to share challenges, useful ideas, suggestions, demonstrations, and examples of teaching commercial subjects. They need to update their classroom practices to be consistent contemporary trends in Art and Design teaching, but which context and culturally sensitive. The course guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about school curriculum.
PST2308-Educational Management	The course deals with issues related to educational management as they affect teachers. It seeks to highlight and evaluate the role of different educational managers at different educational levels and their implications on the production of quality education. Content: The meaning of educational management, Historical development of educational management, Theories of educational management, Types of educational management, Functions and implications of educational management and Organisational and administrative structures in education

PST2210-Final Year Research Project	This module allows students to work intensively under individual supervision on a selected topic. Each student will have a one to one meeting with the supervisor. The module demands that the student exhibits some knowledge on topic selection, methodology, literature review, data presentation and analysis. The students can also choose design project in the specialist subjects.
PDT 2221 Design Enquiry	This course provides students opportunities to conduct enquiry in design research using appropriate research methodology. The course enables students to conduct enquiry in research individually or in teams. Students also develop co-operative research skills to form dynamic research strategies, approaches to design research. This improves research quality and strengthens research quality and co-operation.
PDT 2323 Modelling and materials	Traditional and contemporary modelling materials: Clay, stone, metal, wood, ceramics, glass, plastic, synthetic materials. Advantages of technological materials and processes.

Name of Programme: Bachelor of Design and Technology Education Honours Degree [BDTechEd (Hons)] in Clothing, Textiles and Fashion Design

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**
ZNQF Level	8

Entry Requirements

Normal Entry : Diploma in Education from accredited and recognized institution or equivalent, in the specified subjects; five 'O' Level passes including English Language and Mathematics.

Special Entry: N/A

Mature Entry: N/A

Other: (indicate): N/A

LEARNING OUTCOMES

Holders of the Bachelor of Design and Technology Education Honours Degree [BDTechEd (Hons)] in Clothing, Textiles and Fashion Design will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Design and technology curriculum
- Apply sound research and technological techniques when carrying out research.
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Design and Technology education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**ZIMCHE/ NUST**	**Credits**
Level One: Semester 1		
PST1112-ICT Applications in Education	ZIMCHE	12
PST1118-Culture and Heritage Studies	ZIMCHE	12
PST1163- Entrepreneurship and Financial Management	ZIMCHE	12
PDT 1127 Design Processes and projects	ZIMCHE	12
PDT1190- Fibres, Yarns, Textile and Fabric Production	ZIMCHE	12

PDT1193- Preparation and Finishing Processes	ZIMCHE	12
Level One: Semester 2		
PST1204 Curriculum Development And Evaluation	NUST	12
PST 1211 Research Methods And Statistics	ZIMCHE	12
PDT1295 Textile and Fashion Modelling	ZIMCHE	12
PDT1224 Graphic Design	ZIMCHE	12
PDT 1390 Clothing and Factory Practice	NUST	12
PDT 1293Cultural Context of clothing and Society	NUST	12
Level Two: Semester 1		
PST1101-Theoretical Foundations in STEM Education	NUST	12
PST3000 Work Based Experience	NUST	12
PST 2105 Testing, Assessment And Evaluation	NUST	12
PDT 2194 Research in Clothing and Fashion	NUST	12
PDT 2190 Life Style and Fashion Design	ZIMCHE	12
PDT 2125 Design Marketing	ZIMCHE	12
Level Two: semester 2		
PDT2225 Advanced Pedagogies In Clothing Textile and Fashion	NUST	12
PST2308-Educational Management	NUST	12
PST2210-Final Year Research Project	ZIMCHE	24
PDT 2291 Fashion Design	ZIMCHE	12
PDT 2292 Textile Design Techniques	ZIMCHE	12
PDT 2220 Design Project	NUST	12
		180
TOTAL OF CREDITS FOR NUST FLAIR		**120**
GRAND TOTAL Of MKS CREDITS (100%)		**300**

MODULE SYNOPSIS

MODULE	SYNOPSIS
PST1112-ICT Applications in Education	This module seeks to equip students with skills of improving learning and teaching through the use of various instructional media that include audio visual communication. The module will also familiarise students with different computer software including Ms Word, Ms Excel, Ms Access, PowerPoint and the Publisher. Upon completion of the module students should be able to design and use instructional media, create data bases and tables, query information from tables, open/close files and directories, analyse students' performance using the Excel formulas and research from the internet.
PST1118-Culture and Heritage Studies	This module will introduce scholars to definition terms of culture and heritage. The module will expose the learners to issues like civic education, spirituality, tangible and nontangible Zimbabwean resources. History of Zimbabwe and its different ethnic groupings in different geographical locations. Learners would be challenged to be tolerant and enjoy the multicultural status of the nation.
PST1163- Entrepreneurship and Financial Management	The courses give basics on how business is managed from a small scale to high scales. The module will expose the learners to various businesses models and financial management systems that can be used to start and sustain business projects. Marketing strategies will also form part of this module.
PDT1190- Fibres, Yarns, Textile and Fabric Production	Classification of textile fibres; broad outline of production methods of the main man-made fibres; physical and behavioural characteristics. Fibres to Yarns, Fibres preparatory processes, carding, intermediate stage-processing and spinning within the various systems. Filaments and their preparation; classification. Woven, knitted and non-woven structures, their production, processes, design and analysis advances and future trends, selection of fabrics. Product design and development
PDT1193- Preparation and Finishing Processes	Finishing processes for various textile materials, application of finishes for enhancement and performance; product and garment after care-labelling, applied finishes selection of laundering processes. Preparation processes for various textile applications of colour, printing, fastness, principles of colouration

PDT 1127 Design Processes and projects	Design process strategy in design; its application in identifying a need or opportunity leading to design brief, analysis, research, using research results in specifications. Generation and appraisal of design ideas. Modelling of ideas, Product development and planning. Realisation. Testing and evaluation.
PST1204 Curriculum Development and Evaluation	Curriculum terminology and concepts; ideology and philosophy underpinning curriculum planning, development and evaluation. Curriculum needs assessment models. The impact of social, economic, political, technological, psychological, philosophical and cultural, environmental influences on the curriculum. Process and product models of curriculum development; objectives models e.g. Tyler, Wheeler; decision-making models e.g. Stuffle beam (CIPP); Designing/developing, delivering and evaluating a curriculum. Curriculum change and innovation; strategies for change Varying modes of delivering the curriculum, including flexible, distance, open and resource-based learning, and independent study. Examples of curriculum projects in Zimbabwe and internationally. Concept maps and hierarchies, concept analysis. Roles of CRADU, CDU, RCZ, SIRDC.
PST 1211 Research Methods and Statistics	The module will introduce the learners to the basic principles of research. Qualitative and Quantitative approaches to research will be used. Mixed methods research approach will be introduced in this module. Research instruments will be explored to give the learners an appreciation of these instruments. Applications of descriptive and inferential statistics in education, Sampling theory, probability theory and distribution, the normal distribution, the binomial distribution, the Poisson distribution, applications of significance and hypothesis testing, *X2* test, *t-test, z-test.*
PDT1295 Textile and Fashion Modelling	Textile design techniques; colour theory, colour media, colour separation. Exercises in designing textiles for fashion wear. History of costumes, fashion designs, art movements that influence fashion design. Images for fashion modelling. Fashion drawing, pattern making using ICT. Clothing vs. fashion.

PDT1224 Graphic Design	Nature and history of graphic Design, Computer graphics; 2-Dimensional and 3-Dimensional (2-D & 3-D) drawing in graphic design. Application of digital drawing and photography. Developing digital images, computer design software, tools in graphic design, Advertising designs and print media. Developing graphic products, magazines, packaging and posters. Software e g Corel draw, Publisher, Photoshop, and other software. Colour, texture and the human visual system.
PDT 1390 Clothing and Factory Practice	In this module students shall be exposed to standard fashion practice during clothing production; Safety management systems; factory operations; factory practice; effects of practice and factory equipment.
PDT 1293 Cultural Context of clothing and Society	The psychology of dress. Dress and its forms. Theories and perspectives of dress. Dress as a form of non-verbal communication. Societal influences of dress and cultural aesthetics.
PST1101-Theoretical Foundations in STEM Education	Psychology of education- Physical, cognitive and emotional development in children, adolescents and adults. Piaget, Brunner, Pavlov, Vygotsky, etc. Individual differences and learning styles. Pedagogy and andragogy, memory and understanding. Sociology of education- Human Social Interactions; society and community; urban and rural communities, agents of socialization; culture and education, inclusive learning; industrialization; globalization, citizenship. Durkheim, Weber, Mead, etc. Philosophy of education– theory and practice; trends in philosophy of education, humanism, progressivism, reconstructionism, empiricism, modernism, structuralism, critical theory, hermeneutics, constructivism, phenomenology. Rousseau, Karl Marx, John Dewey, Vygotsky, etc.
PST3000 Work Based Experience	Students get attached to a school environment to acquire practical experience as they interact on a daily basis with the various educational stakeholders
PST 2105 Testing, Assessment And Evaluation	The purposes and methods of assessment; formal/informal; formative/summative; norm/criterion referenced; objective/subjective. Characteristics, strengths and weaknesses of a range of testing methods. Examinations: processing and administration; item writing; examination results grading systems; item analysis; examination boards: HEXCO, ZIMSEC, etc; standardized tests;

	continuous and terminal assessment; portfolio and project assessment; the effects of assessing learners and teachers; evaluation; selecting and using appropriate approaches and tools for evaluating the effectiveness of learning sessions and programmes; quality control techniques and accreditation; trade testing and competency-based testing.
PDT 2194 Research in Clothing and Fashion	This is a project based enquiry that shall provide students with an opportunity to critically evaluate emerging technologies in textile, clothing and fashion design. Research shall be conducted and presentations made on a topic selected from either clothing, textiles or fashion design. Focus shall provide the means to examine the parameters of each aspect and technologies used in detail. Students shall acquire understanding of the design process and develop in-depth drawing and colour expertise alongside technical skills.
PDT 2190 Life Style and Fashion Design	People's life styles; the psychology of clothing, comfort in dress and clothing. Analysis and characteristics of sports and dress textiles and fabrics; sports fashion.
PDT2225 Advanced Pedagogies In Clothing Textile and Fashion	This course is designed to meet practical needs of in- service classroom Art and Design teachers. The purpose of the course is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology course on becoming Art and Design teachers. The course focuses upon classroom techniques, instructional procedures and languages, and teacher/learner interactions. Microteaching sessions focusing on teaching 'A' level Art and Design will be conducted. The teachers need to share challenges, useful ideas, suggestions, demonstrations, and examples of teaching commercial subjects. They need to update their classroom practices to be consistent contemporary trends in Art and Design teaching, but which context and culturally sensitive. The course guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about school curriculum.
PST2308-Educational Management	The course deals with issues related to educational management as they affect teachers. It seeks to highlight and evaluate the role of different educational managers at different educational levels and their implications on the production of quality education. Content: The meaning of educational management, Historical development of educational management, Theories of educational management, Types of educational management,

	Functions and implications of educational management and Organisational and administrative structures in education
PST2210-Final Year Research Project	This module allows students to work intensively under individual supervision on a selected topic. Each student will have a one to one meeting with the supervisor. The module demands that the student exhibits some knowledge on topic selection, methodology, literature review, data presentation and analysis. The students can also choose design project in the specialist subjects.
PDT 2291 Fashion Design	This module outlines the concept of fashion, fashion trends, contemporary fashion, National, regional and international fashion designers and their collection; Emerging artists and their collection; Studio practice in fashion design and application of design principles.
PDT 2292 Textile Design Techniques	The module focuses on visual research and drawing techniques, innovation, creativity design techniques; printing, knitting, embroidery and appliqué. Students are encouraged to develop personal ideas.

Bachelor of Design and Technology Education Honours Degree [BDTechEd (Hons)] in Design and Technology

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**

Entry Requirements

Normal Entry: Diploma in Education from accredited and recognized institution or equivalent, in the specified subjects; five 'O' Level passes including English Language and Mathematics.

Special Entry: N/A

Mature Entry: N/A

Other: (indicate): N/A

LEARNING OUTCOMES

Holders of the BDTechEd degree in Design and Technology will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Design and Technology curriculum
- Apply sound research and technological techniques when carrying out research.
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Design and Technology education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment
Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**ZIMCHE/NUST**	**Credits**
Level One: Semester 1		
PST1112-ICT Applications in Education	ZIMCHE	12
PST1118-Culture and Heritage Studies	ZIMCHE	12
PST1163- Entrepreneurship and Financial Management	ZIMCHE	12
PDT1126- Nature of Design and Technology	ZIMCHE	12
PDT1128- Graphic Products	ZIMCHE	12

PDT 1145 Engineering Drawing	ZIMCHE	12
Level One: Semester 2		
PST1204 Curriculum Development And Evaluation	NUST	12
PST 1211 Research Methods And Statistics	ZIMCHE	12
PDT1325- Workshop Safety and Technology Management	ZIMCHE	12
PDT 1228 Theories of Design Technology	ZIMCHE	12
PDT1229- Electrical Power Sources	ZIMCHE	12
PDT 1221 Design Analysis	NUST	12
Level Two: Semester 1		
PST1101-Theoretical Foundations in STEM Education	NUST	12
PST3000 Work Based Experience	NUST	12
PST 2105 Testing, Assessment And Evaluation	NUST	12
PDT2124- Assessing Design Projects	NUST	12
PDT2129- CAD/CAM Applications in Design and	ZIMCHE	12
PDT2128- Material Sciences	ZIMCHE	12
Level Two: Semester 2		
PDT2225-Advanced Pedagogies in Design and Technology	NUST	12
PST2308-Educational Management	NUST	12
PST2210-Final Year Research Project	ZIMCHE	24
PDT2227- Ergonomics and anthropometry Designs	ZIMCHE	12
PDT2224- Product Development	ZIMCHE	12
PDT 2220 Design Project	NUST	12
MAX MBKs CREDITS		**180**
TOTAL OF CREDITS FOR NUST FLAIR		**120**
GRAND TOTAL Of MKS CREDITS (100%)		**300**

MODULE AND SYNOPIS

MODULE	**SYNOPSIS**

PST1112-ICT Applications in Education	This module seeks to equip students with skills of improving learning and teaching through the use of various instructional media that include audio visual communication. The module will also familiarise students with different computer software including Ms Word, Ms Excel, Ms Access, PowerPoint and the Publisher. Upon completion of the module students should be able to design and use instructional media, create data bases and tables, query information from tables, open/close files and directories, analyse students' performance using the Excel formulas and research from the internet.
PST1118-Culture and Heritage Studies	This module will introduce scholars to definition terms of culture and heritage. The module will expose the learners to issues like civic education, spirituality, tangible and nontangible Zimbabwean resources. History of Zimbabwe and its different ethnic groupings in different geographical locations. Learners would be challenged to be tolerant and enjoy the multicultural status of the nation.
PST1163-Entrepreneurship and Financial Management	The courses give basics on how business is managed from a small scale to high scales. The module will expose the learners to various businesses models and financial management systems that can be used to start and sustain business projects. Marketing strategies will also form part of this module.
PDT1126- Nature of Design and Technology	Issues of definition and scope. Nature of design and technology activity. Capability and creativity. Action knowledge, cognitive processes. Development of skills and personal qualities. Learning by researching. Sustaining learning through motivation and engagement of the learner. Contexts: breadth, depth, balance and relevance. Transferability of knowledge to design situations. Frame work for progression from one level to another.
PDT1128- Graphic Products	Fundamental of graphic products; Two dimensional drawing (2-D), Three dimensional drawing (3-D) products. Computer design software and tools for graphic products e g. CorelDraw, publisher, Photoshop and other software. Practice in the use of CAD and Corel Draw. Production of graphical products. Costing, storage, retrieval, modification, of drawings and integration of data for costing, stock control. Drawing conventions for engineering, electrical and architectural designs. Free-hand sketching and drawing, annotation and recording information.

PDT 1145 Engineering Drawing	The module gives an introduction to engineering drawing; geometrical constructions; tangency constructions; construction of ellipses; orthographic projections of simple geometrical solids and general engineering components in first and third angle; plane geometry; space geometry; dimensioning; pictorial views; freehand sketching; sectioning; intersections; developments; conventions and assembly drawings.
PST1204 Curriculum Development and Evaluation	Curriculum terminology and concepts; ideology and philosophy underpinning curriculum planning, development and evaluation. Curriculum needs assessment models. The impact of social, economic, political, technological, psychological, philosophical and cultural, environmental influences on the curriculum. Process and product models of curriculum development; objectives models e.g. Tyler, Wheeler; decision-making models e.g. Stuffle beam (CIPP); Designing/developing, delivering and evaluating a curriculum. Curriculum change and innovation; strategies for change Varying modes of delivering the curriculum, including flexible, distance, open and resource-based learning, and independent study. Examples of curriculum projects in Zimbabwe and internationally. Concept maps and hierarchies, concept analysis. Roles of CRADU, CDU, RCZ, SIRDC.
PST 1211 Research Methods and Statistics	The module will introduce the learners to the basic principles of research. Qualitative and Quantitative approaches to research will be used. Mixed methods research approach will be introduced in this module. Research instruments will be explored to give the learners an appreciation of these instruments. Applications of descriptive and inferential statistics in education, Sampling theory, probability theory and distribution, the normal distribution, the binomial distribution, the Poisson distribution, applications of significance and hypothesis testing, *X2* test, *t-test, z-test.*
PDT 1221 Design Analysis	The module is about analyzing a design into: design brief, search and order information on a design problem. There is also an appraisal of situations with specific requirements taking into account human needs, aesthetic, technical and environmental factors. Students generate and explore ideas and concepts, evaluate ideas, selection and modelling of a design proposal develop a design proposal, design techniques, technology and technology processes as well as historical & contextual, cultural contexts relativity.

PDT1325- Workshop, Safety and Technology Management	Tools, safety and health, construction materials, construction measuring instruments, personnel in the construction process, construction laws. The workshop environment, safety and care of equipment, space management. Safety and hygiene: workshop safety, ergonomic safety, Government regulations. Environmental stresses and hygiene, chemical stresses, harmful agents through inhalation, skin absorption & ingestion. Control of environmental factors. Measurement and measuring instruments, reliability, precision, scale, steel rules, calipers, micrometers, gauges, etc. Machine shop practice, marking, hand sawing, filing, drilling, and use of lathe Equipment operation and maintenance, fabrication, welding, turning, cutting, soldering and brazing. Equipment acquisition, storage and disposal.
PDT 1228 Theories of Design Technology	Theories: Socio-cultural learning theories, Constructivist theory. Critical theory, institutional theories. Nature of knowledge and its place in education, meanings and areas of design & technology and their justification. Components of design & technology, and curriculum content and experiences for the learner. Technological literacy and capability. STEM and Professional Development of teachers on delivery.
PDT1229- Electrical Power Sources	Characteristics of AC and DC. Principles of step down/up. Voltage and current regulation. Application of Ohm's Law, Measuring voltage, current and resistance. Electronics and Control; Types of switches, transistors, Darlington Pair, capacitors, diodes, sneers, LEDs photodiodes, resistors, transducers. Calculating resistance of series and parallel resistors. Introduction to volt-ampere characteristics of diodes, transistors with power and photo electronic devices. Maxwell's equation for static and harmonic varying current, displacement current, application of circuit theory, semi-conductors, diodes and transistors, logic gates, NAND, NOT, NOR, OR exclusively OR, Boolean algebra, combination logic
PST1101-Theoretical Foundations in STEM Education	Psychology of education- Physical, cognitive and emotional development in children, adolescents and adults. Piaget, Brunner, Pavlov, Vygotsky, etc. Individual differences and learning styles. Pedagogy and andragogy, memory and understanding. Sociology of education- Human Social Interactions; society and community; urban and rural communities, agents of socialization; culture and education, inclusive learning; industrialization; globalization, citizenship. Durkheim, Weber, Mead, etc. Philosophy of education– theory and practice; trends in philosophy of education, humanism, progressivism, reconstructionism, empiricism, modernism, structuralism, critical theory, hermeneutics,

	constructivism, phenomenology. Rousseau, Karl Marx, John Dewey, Vygotsky, etc.
PST3000 Work Based Experience	Students get attached to a school environment to acquire practical experience as they interact on a daily basis with the various educational stakeholders
PST 2105 Testing, Assessment and Evaluation	The purposes and methods of assessment; formal/informal; formative/summative; norm/criterion referenced; objective/subjective. Characteristics, strengths and weaknesses of a range of testing methods. Examinations: processing and administration; item writing; examination results grading systems; item analysis; examination boards: HEXCO, ZIMSEC, etc; standardized tests; continuous and terminal assessment; portfolio and project assessment; the effects of assessing learners and teachers; evaluation; selecting and using appropriate approaches and tools for evaluating the effectiveness of learning sessions and programmes; quality control techniques and accreditation; trade testing and competency-based testing.
PDT2124- Assessing Design Projects	Assessment rubrics in Design Projects; assessment and evaluation of students' Design Projects and products/projects in the community on site and or plant design projects. Research and collaboration field work. Visual research and assessment.
PDT2129- CAD/CAM Applications in Design and Technology	CAD Software for; geometrical constructions, tangency constructions, construction of ellipses, orthographic projections of simple geometrical solids and general engineering concepts in first and third triangle, plane geometry, space geometry, dimensioning pictorial views, freehand sketching, sectioning, intersections, development, conventions, assembly drawings.
PDT2128- Material Sciences	Materials classification and their structure, atomic bonding in materials, crystallisation, dislocations, plastic deformation, temperature measurement, phase diagrams, solidification, liquidification, vaporization, alloy formation, types of material, composite, selection and their applications i.e. wood, plastics, ceramics and other alloys. Materials for Modelling, Theories of models and model making. Imagination, creativity, innovation and invention. Image formation, model making and realization. Problem solving, visual patterns, models, prototypes and artefacts. Material selection for designs, experimentation with a range

	materials. Costs of models for designs, Classification of properties and analysis of materials for design models and product development. Testing and evaluating materials. Directory of design materials. Analysis of design case studies.
PDT2225-Advanced Pedagogies in Design and Technology Education	This course is designed to meet practical needs of in- service classroom Art and Design teachers. The purpose of the course is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology course on becoming Art and Design teachers. The course focuses upon classroom techniques, instructional procedures and languages, and teacher/learner interactions. Microteaching sessions focusing on teaching 'A' level Art and Design will be conducted. The teachers need to share challenges, useful ideas, suggestions, demonstrations, and examples of teaching commercial subjects. They need to update their classroom practices to be consistent contemporary trends in Art and Design teaching, but which context and culturally sensitive. The course guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about school curriculum.
PST2308-Educational Management	The course deals with issues related to educational management as they affect teachers. It seeks to highlight and evaluate the role of different educational managers at different educational levels and their implications on the production of quality education. Content: The meaning of educational management, Historical development of educational management, Theories of educational management, Types of educational management, Functions and implications of educational management and Organisational and administrative structures in education
PST2210-Final Year Research Project	This module allows students to work intensively under individual supervision on a selected topic. Each student will have a one to one meeting with the supervisor. The module demands that the student exhibits some knowledge on topic selection, methodology, literature review, data presentation and analysis. The students can also choose design project in the specialist subjects.
PDT2227-Ergonomics and anthropometry Designs	Aesthetics; use of design elements, effects of light and shade and rendering on solid forms, surface finishes. Aesthetic sensibility and vocabulary: harmony, conflict, static & dynamic. Significance of style and influence of designs. Ergonomics: Understand the influence of ergonomics in design. Interpreting and applying anthropometric data in designs. Principles employed in CAD/CAM.

PDT2224- Product Development	The module looks at the application of the design process in the development of design products; development of drawing skills through imagination, origination, creativity and realizing of own ideas through products; Mini design projects and production of designs.

MASTERS

Name of Programme Master of Technology Education in Applied Art and Design

Duration	1½ years
Minimum Credit Load	270
Maximum Credit Load	330
M aximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Special Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

LEARNING OUTCOMES/MASTERS LEVEL COMPETENCES

A holder of the Master of Technology Education in Applied Art and Design degree will be able to:

- Use innovative technology-enhanced teaching strategies to implement the curriculum;
- Apply sound research and technological techniques when carrying out research in design education;
- Be critical, creative and design oriented;
- Monitor, assess and evaluate learners, learning processes, project and programmes related to design education;
- Analyse and exploit entrepreneurial opportunities to promote innovation and production of artefacts;
- Adapt to educational changes in their environments to promote innovation and industrialization;
- Be respectful and ethical in all interactions in both their professional and personal exchanges;
- Manage both personal and institutional finances and
- Demonstrate influential communication skills.

Assessment

Coursework: Comprising various assignments and class tests these amount to 40%

By dissertation/thesis: N/A

Written Examinations: Coming at the end of every semester, these add up to 60%.

Module name	**ZIMCHE/NUST**	**Credits**
Level One: Semester 1		
PST6101-Philosophical issues in STEM education	NUST	18
PDT6124-Trends in Applied Art and Design	ZIMCHE	18
PDT 6120 Design and Human Culture	ZIMCHE	18
PDT 6122 Materials and Technologies for Design	ZIMCHE	18
PDT 6123 Digital Design	ZIMCHE	18
Level One: Semester 2		
PST6211-Advanced Research Methods and Statistics	NUST	18
PDT 6208 –Quality Assurance	NUST	18
PDT6291-Curriculum and Pedagogical Issues in Applied Art and Design	ZIMCHE	18
PDT 6222 Intellectual Property and Design	ZIMCHE	18
PDT6424 Assessment of Design Projects	NUST	18
Level Two: Semester 1		
PST6205-Assessment in STEM Education	NUST	18
PST6310-Dissertation	ZIMCHE	90
PDT6322-Product Design	ZIMCHE	18
PDT 6320 Design Project 1	NUST	18
MAX MBKs CREDITS (80%)		**306**
MBKs CREDITS WITH NUST FLAIR (20%)		
GRAND TOTAL Of MKS CREDITS (100%)		**324**

MODULE AND SYNOPSIS

MODULE	**SYNOPSIS**
PST6101-Philosophical issues in STEM	The module explores the nature of scientific/mathematical knowledge; science sub-culture; knowledge bases and knowledge management; indigenous knowledge and science; views and

education	conceptions of STEM education; alternative views; paradigms and ideologies; positivist, postpositivist, modernist, postmodernist, functionalist, inductivist and feminist perspectives
PDT6124-Trends in Applied Art and Design	The module introduces students to trends to Applied Art and Design. Contemporary research themes in Applied Art and Design. The impact of research to teachers Applied Art and Design knowledge domain. Effects of research in Applied Art and Design on content and pedagogy. How to analyse research reports
PDT 6120 Design and Human Culture	The module is designed to build in the students, an awareness of cross-cultural issues that inform and affect the production, consumption and perception of design and its products. In this module students explore and analyze the reciprocal influence between design and human culture. Topics to be covered include: design as culture embodiment, design and cultural determinism, cultural fundamentalism in design, bio-mimicry and human design culture, multiculturalism and mono culturalism in design, cultural nostalgia and archaism in design, trans cultural fusion and hybridization, and cultural diversity and globalization in design practice. This, it is hoped, shall empower the students to be able to design socially compatible and emotionally rewarding designs that fit in the context of the diverse cultures of the global consumer market.
PDT 6122 Materials and Technologies for Design	This module explores the materials, tools and technologies used for design production in art and design studios and workshop. The module encourages familiarisation with the traditional use of these materials and technologies as well as exploration of new or improvised uses of the materials. Topics to be covered include; the general classifications of art and design materials including ceramics, metals, polymeric, composite materials etc., the properties of commonly used art and design materials that include paper, woods, clays, stones, metal, rubber, textiles and fibre glass; the manufacturing processes of these art and design materials; and the use of both computerized and manual approaches to art and design production. A series of small projects designed to expand students' horizons in art and design production while maintaining fidelity to effective use of art and design materials shall be done by students.
PDT 6123 Digital Design	In this module students shall explore technological visual communication, drawings, including digital design. Students shall have an opportunity to painting, graphic design use of ICT for drawing, painting, rendering techniques and digital design. They shall interact with Corel draw, Photo shop or other art software for drawing and painting including 3D drawing, printing and digital image product making. Topics to be covered include fine art drawing and painting using technological media, tools and techniques. The module is intended to expose students to a variety of technological and graphic designs.
PST6211-Advanced Research Methods and Statistics	The course will improve students' understanding and applicability of Research paradigms and research designs. Furthermore, the course will expose students to different types of research (e.g. action research, experimental, traditional researches etc). In addition the course will

	assist students to understand different types of research instruments and how to ensure validity and reliability for these instruments. It is further acknowledged that the course will ensure students understand what is meant by population, sample and sampling techniques in research. The course will also assist the students to appreciate the purpose of the Theoretical framework in research contexts. Students will be exposed to different types of paradigms, approaches and data collection methods. The course further exposes students to statistical and quantitative research designs; experimental, quasi-experimental, correlation, hypothesis testing; ANOVA, ANCOVA, data analysis using ICT software e.g. SPSS, SAS; Atlas, etc; qualitative research designs; content and thematic analysis; qualitative data analysis (QDA) software and application of data analysis techniques. Finally the course will ensure students understand how to apply research ethics in real research contexts.
PDT 6208 – Quality Assurance	The module highlights inputs, processes and products of science, mathematics and technology education; measures of quality in teaching, assessment and educational management; resource planning and mobilisation; accreditation, standards control; research and case studies in quality science and mathematics education.
PDT6291- Curriculum and Pedagogical Issues in Applied Art and Design	The course is designed to enable students to explain and analyse recent pedagogical developments in Clothing Textile and Fashion Design Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of the Clothing Textile and Fashion curriculum
PDT 6222 Intellectual Property and Design	The aim of the module is to develop an awareness of the need for legal protection of designs and art works. National, regional and international laws are examination and application; Intellectual property rules for securing and enforcing legal rights for inventions, designs, and artistic works; Trademarks: trademark registration and protection of symbols, names and slogans used to identify goods and service; Patenting: inventors exclusive rights to creations on machines, technological improvements and manufactured goods; protection of exclusive control of intangible assets, use of products in the marketplace, patenting procedures and government databases as well as copyrights: Understanding of protecting the act of creation and unpublished works and protecting against infringement, notice of trademarks and litigation.
PDT6424 Assessment of Design Projects	The module will highlight exhibitions and Displays, assessing products / artefacts, assessing digital visual products, preparing check lists for assessment, designing assessment reports as well as apply a variety of research based assessment techniques for diverse learners. There will be a one-to-one assessment on individual growth, assessment of achievement of objectives, knowledge and skills, processes, creativity, innovation, design criticism, techniques, strategies, materials and technologies to meet instructional purposes as well as an engagement of students in assessment. Methods of assessment will include journals

	or sketch books, observation, Interviews, group discussion, critiques and assessing design projects
PST6205-Assessment in STEM Education	This module covers testing, measurement and evaluation; categorising assessment; judging the quality of assessment tools and processes; measures of validity and reliability as well as examination systems and processes.
PST6310-Dissertation	This course introduces students to the practical application of research strategies and techniques to produce a dissertation of acceptable quality
PDT6322-Product Design	In this module students shall explore and interrogate the processes of designing products from their initial conception to the final solution. Different approaches to the product design process shall be studied. Topics to be covered include ideation, rapid visualization, rendered drawings, prototyping, problem solving, three dimensional modelling, technical/work drawings, and product realization. The module shall take students through projects that involve real life problems and issues they identify in their society and encourage them to design ideas, concepts or products that solve these problems.
PDT 6320 Design Project 2	In consultation with advisor, the student conducts design project for concentrated design study. The elements of the study shall include, but not limited to, Design processes, literature search, experimental design, and design case study research, brain storming models in design, design project proposal preparation and presentation. The module is about the development of possible solutions, creativity, using software for design, developing the chosen solution, critical analysis and further development of design to meet specifications, continued application of design processes; testing and evaluation, exhibition and oral presentation of design.

NAME OF PROGRAMME MASTER OF TECHNOLOGY EDUCATION IN CLOTHING TEXTILE AND FASHION DESIGN

Duration	1½ years
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.
Special Entry: N/A

Mature Entry: N/A

Other (indicate): N/A

LEARNING OUTCOMES/MASTERS LEVEL COMPETENCES

A holder of the Master of Technology Education in Clothing Textile and Fashion Design degree will be able to:

- Use innovative technology-enhanced teaching strategies to implement the curriculum;
- Apply sound research and technological techniques when carrying out research in design education;
- Be critical, creative and design oriented;
- Monitor, assess and evaluate learners, learning processes, project and programmes related to design education;
- Analyse and exploit entrepreneurial opportunities to promote innovation and production of artefacts;
- Adapt to educational changes in their environments to promote innovation and industrialization;
- Be respectful and ethical in all interactions in both their professional and personal exchanges;
- Manage both personal and institutional finances and
- Demonstrate influential communication skills.

Assessment

Coursework: Comprising various assignments and class tests these amount to 40%

By dissertation/thesis: N/A

Written Examinations: Coming at the end of every semester, these add up to 60%.

Module name	**ZIMCHE/NUST**	**Credits**
Level One: Semester 1		
PST6101-Philosophical issues in STEM education	NUST	18
PDT6124-Trends in Clothing Textiles and Fashion	ZIMCHE	18
PDT6191-Dress Culture and Human Behaviour	ZIMCHE	18
PDT6193 –Visual Merchandising and Display	ZIMCHE	18
PDT 6195 Textile and Apparel product design	ZIMCHE	18
Level One: Semester 2	NUST	18

PST6211-Advanced Research Methods and	NUST	18
PDT 6208 –Quality Assurance	ZIMCHE	18
PDT 6294 Textile Performance and Evaluation	ZIMCHE	18
PDT6291-Curriculum and Pedagogical Issues in Clothing, Textile and Fashion Design	NUST	18
PDT6424 Assessment of Design Projects	NUST	18
Level Two: Semester 1		
PST6205-Assessment in STEM Education	NUST	18
PDT6390-Contemporary Issues in textile and Apparel Design	ZIMCHE	18
PST6310-Dissertation	ZIMCHE	90
PDT 6320 Design Project 1	NUST	18
MAX MBKs CREDITS (80%)		
MBKs CREDITS WITH NUST FLAIR (20%)		
GRAND TOTAL Of MKS CREDITS (100%)		**306**

MODULE	**SYNOPSIS**
PST6101-Philosophical issues in STEM education	The module explores the nature of scientific/mathematical knowledge; science sub-culture; knowledge bases and knowledge management; indigenous knowledge and science; views and conceptions of STEM education; alternative views; paradigms and ideologies; positivist, postpositivist, modernist, postmodernist, functionalist, inductivist and feminist perspectives
PDT6124-Trends in Clothing Textiles and Fashion Design	The module introduces students to trends to Clothing Textiles and Fashion Design. Contemporary research themes in Clothing Textiles and Fashion design. The impact of research to teachers in Clothing Textiles and Fashion design knowledge domain. Effects of research in Clothing Textiles and Fashion Design on content and pedagogy. How to analyse research reports
PDT6191-Dress Culture and Human Behaviour	The module explains the complete phenomenon of bodily adornment is explored in relationship to values, attitudes, activities and beliefs; the dress as an expression of self and reflection of society and global cultures; effects of dress on human behaviour at personal, interpersonal and social organizational levels. Students develop analytical skills to help them understand the role played by clothing in different times, places and contexts.
PDT6193 –Visual Merchandising and Display	The course will improve students' understanding and applicability of Research paradigms and research designs. Furthermore, the course will expose students to different types of research (e.g. action research, experimental, traditional researches etc). In addition the course will

	assist students to understand different types of research instruments and how to ensure validity and reliability for these instruments. It is further acknowledged that the course will ensure students understand what is meant by population, sample and sampling techniques in research. The course will also assist the students to appreciate the purpose of the Theoretical framework in research contexts. Students will be exposed to different types of paradigms, approaches and data collection methods. The course further exposes students to statistical and quantitative research designs; experimental, quasi-experimental, correlation, hypothesis testing; ANOVA, ANCOVA, data analysis using ICT software e.g. SPSS, SAS; Atlas, etc; qualitative research designs; content and thematic analysis; qualitative data analysis (QDA) software and application of data analysis techniques. Finally the course will ensure students understand how to apply research ethics in real research contexts.
PDT 6195 Textile and Apparel product design	This module advances the knowledge of designing textiles and apparel as two or three dimensional art forms with emphasis on conceptualisation, expression, media, techniques, lighting, space, movement and function as influential factors, experimentation with colour and design and surface decoration methods, the use of CAD in the production of a prototype fabric and other designing software packages, use of 3D software, 3D product visualization, designing and texture mapping, colour reduction, preparation of patterns and pattern grading, garment analysis, product development and material utilisation.
PST6211-Advanced Research Methods and Statistics	The course will improve students' understanding and applicability of Research paradigms and research designs. Furthermore, the course will expose students to different types of research (e.g. action research, experimental, traditional researches etc). In addition the course will assist students to understand different types of research instruments and how to ensure validity and reliability for these instruments. It is further acknowledged that the course will ensure students understand what is meant by population, sample and sampling techniques in research. The course will also assist the students to appreciate the purpose of the Theoretical framework in research contexts. Students will be exposed to different types of paradigms, approaches and data collection methods. The course further exposes students to statistical and quantitative research designs; experimental, quasi-experimental, correlation, hypothesis testing; ANOVA, ANCOVA, data analysis using ICT software e.g. SPSS, SAS; Atlas, etc; qualitative research designs; content and thematic analysis; qualitative data analysis (QDA) software and application of data analysis techniques. Finally the course will ensure students understand how to apply research ethics in real research contexts.
PDT 6208 –Quality Assurance	The module highlights inputs, processes and products of science, mathematics and technology education; measures of quality in teaching, assessment and educational management; resource planning and mobilisation; accreditation, standards control; research

	and case studies in quality science and mathematics education.
PDT 6294 Textile Performance and Evaluation	This module exposes students to textile science, performance enhancement and methods of analyzing and predicting the behaviour of the resultant products. The module is also about characteristics of fabrics and fabric mechanical properties, principles and applications of KES and FAST fabric evaluation systems, dimensional stability, surface modification techniques, oil/water repellence, waterproofing, coating, lamination, microscopy and surface analysis as well as textile colouration and finishing.
PDT6291-Curriculum and Pedagogical Issues in Clothing, Textile and Fashion Design	The course is designed to enable students to explain and analyse recent pedagogical developments in Clothing Textile and Fashion Design Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of the Clothing Textile and Fashion curriculum
PDT6424 Assessment of Design Projects	The module will highlight exhibitions and Displays, assessing products / artefacts, assessing digital visual products, preparing check lists for assessment, designing assessment reports as well as apply a variety of research based assessment techniques for diverse learners. There will be a one-to-one assessment on individual growth, assessment of achievement of objectives, knowledge and skills, processes, creativity, innovation, design criticism, techniques, strategies, materials and technologies to meet instructional purposes as well as an engagement of students in assessment. Methods of assessment will include journals or sketch books, observation, Interviews, group discussion, critiques and assessing design projects
PST6205-Assessment in STEM Education	This module covers testing, measurement and evaluation; categorising assessment; judging the quality of assessment tools and processes; measures of validity and reliability as well as examination systems and processes.
PST6310-Dissertation	This course introduces students to the practical application of research strategies and techniques to produce a dissertation of acceptable quality
PDT 6320 Design Project 2	In consultation with advisor, the student conducts design project for concentrated design study. The elements of the study shall include, but not limited to, Design processes, literature search, experimental design, and case study research, brain storming models in design, design project proposal preparation and presentation. The module is about the development of possible solutions, creativity, using software for design, developing the chosen solution, critical analysis and further development of design to meet specifications, continued application of design processes; testing and evaluation, exhibition and oral presentation of design.
PDT6390-Contemporary Issues in textile and Apparel Design	This module is concerned with significant issues that impact the textile and apparel industry and solutions, theories of entrepreneurship in the textiles and apparel sector, quality theory and practice, global competitiveness, strategies of life cycle management, capacity planning and forecasting, managing technological change. It also looks

	into intellectual property management and Design Protection (Functions of designs in business and organizations, quality assurance, creating high performance designs, consultation and training in use of designs; adapting designs to changing environment and results based-design frameworks.

NAME OF PROGRAMME MASTER OF TECHNOLOGY EDUCATION IN DESIGN AND TECHNOLOGY

Duration	1½ years
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Special Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

LEARNING OUTCOMES/MASTERS LEVEL COMPETENCES

A holder of the Master of Technology Education in Design and Technology degree will be able to:

- Use innovative technology-enhanced teaching strategies to implement the curriculum;
- Apply sound research and technological techniques when carrying out research in design education;
- Be critical, creative and design oriented;
- Monitor, assess and evaluate learners, learning processes, project and programmes related to design education;
- Analyse and exploit entrepreneurial opportunities to promote innovation and production of artefacts;
- Adapt to educational changes in their environments to promote innovation and industrialization;
- Be respectful and ethical in all interactions in both their professional and personal exchanges;
- Manage both personal and institutional finances and
- Demonstrate influential communication skills.

Assessment

Coursework: Comprising various assignments and class tests these amount to 40%

By dissertation/thesis: N/A

Written Examinations: Coming at the end of every semester, these add up to 60%.

Module name	**ZIMCHE/NUST**	**Credits**
Level One: Semester 1		
PST6101-Philosophical issues in STEM education	NUST	18
PDT6124-Trends in Design and Technology Education	ZIMCHE	18
PDT6126-Nature of Design and Technology	ZIMCHE	18
PDT6129-CAD/CAM Applications and Manufacturing	ZIMCHE	18
PDT6128-Advanced Graphic Products	ZIMCHE	18
Level One: Semester 2		
PST6211Advanced Research Methods and Statistics	NUST	18
PDT 6208 Quality Assurance	NUST	18
PDT6291Curriculum and Pedagogical Issues in Design and Technology	ZIMCHE	18
PDT6225 Workshop Technology and Management	ZIMCHE	18
PDT6424 Assessment of Design Projects	NUST	18
Level Two: Semester 1		
PST6205-Assessment in STEM Education	NUST	18
PDT 6331 Application of Mathematics and Science in Design	ZIMCHE	18
PST6310-Dissertation	ZIMCHE	90
PDT 6320 Design Project 2	NUST	18
MBKs CREDITS WITH NUST FLAIR (20%)		
GRAND TOTAL Of MKS CREDITS (100%)		**306**

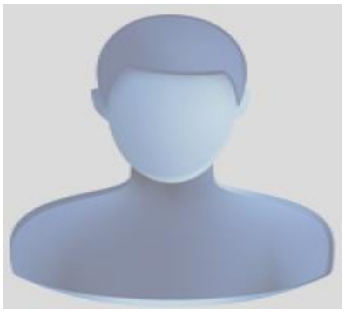
MODULE	SYNOPSIS
PST6101-Philosophical issues in STEM education	The module explores the nature of scientific/mathematical knowledge; science sub-culture; knowledge bases and knowledge management; indigenous knowledge and science; views and conceptions of STEM education; alternative views; paradigms and ideologies; positivist, postpositivist, modernist, postmodernist, functionalist, inductivist and feminist perspectives
PDT6124-Trends in Design and Technology Education	The module introduces students to trends to Design and Technology education. Contemporary research themes in Design and Technology education. The impact of research to teachers in Design Technology Education knowledge domain. Effects of research in Design and Technology Education on content and pedagogy. How to analyse research reports
PDT6126-Nature of Design and Technology	This module is concerned with the nature of design and technology and significant issues that contribute to knowledge, skills and development of positive attitudes through design and technology processes. The module identifies theories of constructivism in design and entrepreneurship in product design. The module addresses global trends in technological management change.
PDT6129-CAD/CAM Applications and Manufacturing	The module looks at the following topics: Application of CAD/CAM in Design and Technology manufacturing systems for mass production; Interactive computer graphics and simple examples of CAD: Introduction; Hardware for CAD/CAM; Software for CAD/CAM; Computer Plotting and Display; Interactive Graphics; Simple Examples of Computer-Aided Drafting, Design and Analysis; CAD/CAM of elements and systems; Modelling of Elements and Systems; Manipulation of System's Transfer Function-- Introductory Finite Element Matrix Analysis; Elementary Numerical Methods of Solution; Analogy and Hybrid Computer Application.
PDT6128-Advanced Graphic Products	The module explores design influences and methodology the concepts of market-pull and producer-led design, influences of style and fashion upon design, need of designers to consider physical, cultural and aesthetic needs, production techniques and marketing methods used in the commercial world, drawing software, recognising the advantages of accuracy, ease of storage/retrieval, ease of modifying drawings, the production of many originals and the integration of data for costing, range of drawing conventions, including engineering, electrical and architectural. It also looks at recording

	information free-hand sketching, annotation, bar and pie charts, 2D and 3D charts, graphs, tables, flow charts, pictograms and ideograms; modelling and testing construct two and three dimensional models; drawing systems assembled, exploded and cut-away, orthographic in first and third angle projection, dimensioning, isometric, Plano metric using 45/45, perspective using one and two point; presentation ability to enhance the visual impact of an illustration by the use of thick and thin line techniques, tone, colour, shadows, reflections and material representation; geometry loci to determine the path of movement of linkages, development (net) of basic geometric forms including prisms, cylinders, pyramids, cones and their frustums, Mechanisms methods for transmitting and converting linear and rotary motion including cranks, ratchets and simple cams, Materials general knowledge of the characteristics of card, paper and other modelling materials, general knowledge of wood, metals, plastics, concrete, brick, fabrics, glass and ceramics, being able to select them for appropriate use according to their characteristics, properties and performance.
PST6211Advanced Research Methods and Statistics	The course will improve students' understanding and applicability of Research paradigms and research designs. Furthermore, the course will expose students to different types of research (e.g. action research, experimental, traditional researches etc). In addition the course will assist students to understand different types of research instruments and how to ensure validity and reliability for these instruments. It is further acknowledged that the course will ensure students understand what is meant by population, sample and sampling techniques in research. The course will also assist the students to appreciate the purpose of the Theoretical framework in research contexts. Students will be exposed to different types of paradigms, approaches and data collection methods. The course further exposes students to statistical and quantitative research designs; experimental, quasi-experimental, correlation, hypothesis testing; ANOVA, ANCOVA, data analysis using ICT software e.g. SPSS, SAS; Atlas, etc; qualitative research designs; content and thematic analysis; qualitative data analysis (QDA) software and application of data analysis techniques. Finally the course will ensure students understand how to apply research ethics in real research contexts.
PDT 6208 Quality Assurance	The module highlights inputs, processes and products of science, mathematics and technology education; measures of quality in teaching, assessment and educational management; resource planning and mobilisation; accreditation, standards control; research and case studies in quality science and mathematics education.
PDT6291Curriculum and	The course is designed to enable students to explain and

Pedagogical Issues in Design and Technology	analyse recent pedagogical developments in Design and Technology Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of Design and Technology Education curriculum
PDT6225Workshop Technology and Management	Industrial manufacturing plant planning. Structures, equipment, tools. Materials, equipment and machinery supplies for manufacturing. Planning and setting up plans for manufacturing: machinery, equipment and tools for processing. Management: of space and resources (time, equipment, tools, and materials). Production management, management of control systems, technology marketing, information systems management.
PDT6424 Assessment of Design Projects	The module will highlight exhibitions and Displays, assessing products / artefacts, assessing digital visual products, preparing check lists for assessment, designing assessment reports as well as apply a variety of research based assessment techniques for diverse learners. There will be a one-to-one assessment on individual growth, assessment of achievement of objectives, knowledge and skills, processes, creativity, innovation, design criticism, techniques, strategies, materials and technologies to meet instructional purposes as well as an engagement of students in assessment. Methods of assessment will include journals or sketch books, observation, Interviews, group discussion, critiques and assessing design projects
PST6205-Assessment in STEM Education	This module covers testing, measurement and evaluation; categorising assessment; judging the quality of assessment tools and processes; measures of validity and reliability as well as examination systems and processes.
PST6310-Dissertation	This course introduces students to the practical application of research strategies and techniques to produce a dissertation of acceptable quality
PDT 6320 Design Project 2	In consultation with advisor, the student conducts design project for concentrated design study. The elements of the study shall include, but not limited to, Design processes, literature search, experimental design, and case study research, brain storming models in design, design project proposal preparation and presentation. The module is about the development of possible solutions, creativity, using software for design, developing the chosen solution, critical analysis and further development of design to meet specifications, continued application of design processes; testing and evaluation, exhibition and oral presentation of design.
PDT 6331 Application of Mathematics and Science in Design	Design and programming, assessment of modeling and simulation technologies. Analyzing complex design systems. Mathematical and Scientific Computations. Initial

	value problems. Solution of longer Linear systems. Electronics, power sources and circuits.

DEPARTMENTAL STAFF



Chairperson Dr Elphina Mhlanga

1. **Full name and job title**: Dr Elphina Mhlanga Chairperson
2. **Qualifications:** Doctor of Philosophy in Education (University of Fort Hare, South Africa), Master of Education Degree in Textiles and Fashion Design (Midlands State University, Zimbabwe), Bachelor of Education Honours Degree in Clothing Textiles and Fashion Design (National University of Science and Technology) and Diploma in Education (University of Zimbabwe).
3. **Skills and competencies:** Teaching; Supervision, Monitoring and Evaluation of undergraduate and postgraduate students research projects; Module Writing, administration, invigilation and marking of undergraduate and postgraduate examinations; research; communication; data analysis tools-SPSS &Excel; involvement in community services and development programmes; drawing, designing using designing software, Facilitating Seasonal Livelihoods Programming. Designing new programmes,
4. **Research Interests:** Gender, Textile Technology and Design and Sustainable Development.
5. **Research and Publications**

- **Mhlanga, E.,** Mushoriwa, T. & Mavuso P. M. (2021). Examining Gender disparity of male undergraduates in Textile Technology and Design at university level: The case of

two universities in Zimbabwe. eBangi Journal of social sciences and Humanities. Vol 18, No 9, 58-68. ISSN: 1823-884x

- **Mhlanga, E.,** Mavuso M. P. & Mushoriwa, T. D. (2021). Strategies to Eradicate Gender Disproportion of Male Students in Home Economics Zimbabwean Colleges. African Perspectives on Research, Innovation and Development in the COVID-19 era ISBN: 978-978-58895-3-6
- Shava, G. N., Manokore, K., **Mhlanga, E.,** Mpofu, M., Phuthi, N., Mkwelie, N. & Mangena, A. (2021). Mainstreaming education for sustainable development, the transition towards achieving sustainable development goal 4 on quality in higher education. International Journal of Research in Education Humanities and Commerce Volume 02, Issue 06, 69. ISSN 2583-0333.
- Manokore, K., Tlou, F. N., Mkwelie, N., Phuthi, N., Shava, G. N., **Mhlanga, E.** Mangena, A., Sibanda, Z. & Chasokela, D. (2022). Quality Higher Education for Sustainable Development: The Transition. Towards Achieving Agenda 2030 Global Goals. International Journal of Latest Research in Humanities and Social Science Volume 05 - Issue 02, PP. 09-21.
- **Mhlanga, E**., Tlou, F. N. & Sibanda, Z. (2022). Challenges of Online Teaching and Learning in the Crisis of COVID 19 in Lupane Rural Schools in Matabeleland North in Zimbabwe. International Journal of Latest Research in Humanities and Social Science (IJLRHSS) Volume 05 - Issue 03, 2022 PP. 01-08
- Tlou, F. N., **Mhlanga, E**. & Sibanda Z. (2022). Barriers to the Uptake of Renewable Energies in Institutions of Higher Education: Experiences from a Polytechnic in Zimbabwe International Journal of Advanced Multidisciplinary Research and Studies 2(2):370-374 1, 2,
- **Mhlanga. E**., Tlou, F. N., Shava, G. N., Phuthi, N., Manokore, K., Sibanda, Z., Chasokela, D., Mpofu, M. & Sibanda, L. (2022). Barriers to the Implementation of Agenda 2030 United Nations Global Goals in the Zimbabwean Higher. Education Context. International Journal of Latest Research in Humanities and Social Science (IJLRHSS) Article id HSS-1329- Volume 05 - Issue 05, PP. 01-10

Conference presentations

- Tlou, F. N. & **Mhlanga, E.** (2021). Attainability of the quest for quality sustainable development goal 4 in the context of multiple challenging conditions in higher education

in Zimbabwe Towards Sustainable Development August 12-15) University of Science & Technology. Zimbabwe.

6. **Email**: elphina.mhlanga@nust.ac.zw0

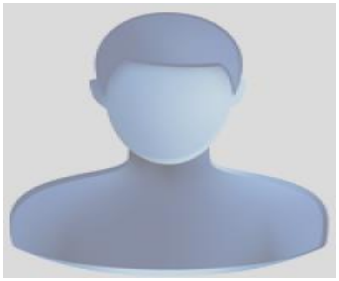
Acting Secretary

Ms Chiedza Zhou

National Certificate in Secretarial Studies

Bulawayo Polytechnic

Profile Picture



Lecturer: Mrs Ntandoyenkosi Gwebu

1. **Full name and job title**: Mrs Ntandoyenkosi Gwebu, Lecturer
2. **Qualifications:** PhD-Education (in progress) (North-West University, South Africa); Master Technical Education (Textile, Clothing and Design) (TechEd)- (University of Zimbabwe); Bachelor of Education Degree in Home Economics (Bed-HE)- (University of Zimbabwe); Diploma in Secondary Education- Home Economics (Gweru Teachers' College).

3. **Skills and competencies:** Teaching; Guidance and counselling; Charity work

4. **Research Interests:** Entrepreneurship education; Technical, Vocational Education & Training; Textile production

5. **Research and Publications**

- Ruvengo, L, Chingozha, M.P, Shava, G, Mkwelie N, **Gwebu, N**, Manokore, K and Muzari, T. (2022) Moving from the Edge to the Centre; the Role of Zimbabwe Higher Education in Achieving Education for Sustainable Development: addressing the Quality Imperative, *International Journal of research in Academic World,* 1 (15), 78-84
- Shava George, Mkwelie Nhlanhla & **Gwebu, Ntandoyenkosi** (2023) The Paradox of Leadership and Gender, Women in Higher Education Management: The Zimbabwean perspective, *International Journal of Research and Innovation in Social Science,*1 (7),201-218

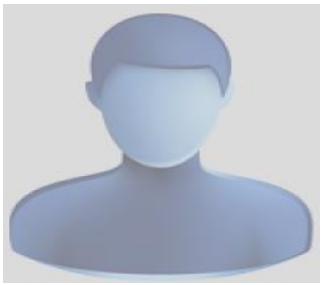
- Chitera, J, **Gwebu, N** & Moyo, P. V. (2023) Exploring E- Learning as an alternative Pedagogical Approach to Teaching and Learning during the Covid-19 Pandemic in two secondary schools in Bulawayo, *International Journal of Research in Academic World,*2(8), 38-43

Conference Presentations

- Kudakwashe Manokore, Sibanda Zibulo, **Ntandoyenkosi Gwebu** Conference Presentation Inclusivity and Sustainable Development: A Case for Zimbabwe Higher Education Towards the Universal Design University. (2022). Faculty of Science and Technology Education (FSTE). National University of Science and Technology (NUST).
- Chitera, J, **Gwebu, N** & Moyo, P. V. Conference Presentation Inclusivity and Suistainable Developmement: Exploring E- Learning as an alternative Pedagogical Approach to Teaching and Learning during the Covid-19 Pandemic in two secondary schools in Bulawayo (2022). Faculty of Science and Technology Education (FSTE). National University of Science and Technology (NUST).

6. **Email**: ntandoyenkosi.gwebu@nust.ac.zw

Profile Picture



Lecturer: Professor Faith Nomathemba Tlou

1. Name: Faith Nomathemba Tlou (Associate Professor).
2. **Qualifications**: Doctor of Philosophy (University of Fort Hare) MEd Curr & Arts (University of Zimbabwe) BAEd (University of Sierra Leone).
3. **Skills & Competences**: Analysis of Curriculum Issues, Education Foundations & Teaching Strategies; Research; Assessment & Communication.
4. **Research Interest** :Practices of Educators & Alignment of Policy & Practices in Education; Barriers in Teaching and Learning; Quality issues; Assessment of Education Goals Achievements & challenges; Sustainability in Education.

5. **Publications**

1. **Tlou F.N.** & Feza, N. N. (2017) Grade R educators voluntarily share their mathematics practices: Authentic realities in South Africa showcased. South African Journal of Childhood Education 7(1)1-9.

2. **Tlou F.N**. & Feza, N. N. (2018) Grade R Educators' Perceptions of Their Own Practices: A CaseStudy of Educators in the Eastern Cape of South Africa. International Journal of Educational Sciences, 20 (3): 33-40.

3. **Tlou F.N.** & Shava, G. N. (2018) Alignment and Mismatches between Grade R Educators' Views of their own Practices and Curriculum Expectations in Mathematics Education: A Reality Check. International Journal of Progressive Research in Education 1(2) 65-73.

4. Shava, G.N. and **Tlou. F. N**. (2018) Principal Leadership and School Improvement: Experiences from South African School Contexts. International Journal of Innovative and Applied Research 6(12) 1-10.

5. Shava, G.N. and **Tlou, F.N.** (2018) Distributed Leadership in Education, Contemporary Issues in Educational Leadership. African Educational Research Journal 6 (4)279-287.

6. Shava, G.N. **Tlou, F.N.** & Mpofu, M.M.(2019) Challenges Facing Women in Leadership Positions, Experiences from a district in Zimbabwe. Journal of Education and Practice. 10(14) 30-40.

7. Shava G.N & **Tlou F. N.** (2019) So Few Women in Leadership Positions in Higher Education. Experiences From a University in Zimbabwe. International Journal of Education Humanities and Social Science 2 (1) 21-36.

8. Shava, G.N, Chasara, T, **Tlou F. N.** Mathonsi,E. "Leadership and Gender, women management: the social realist analytical theoretical view point" International Journal of Research and Innovation in Social Science (IJRISS) volume-5-issue-4, pp.94-101 May 2021 URL: https://www.rsisinternational.org/journals/ijriss/Digital-Library/volume-5-issue-4/94-101.pdf

9. **Tlou, Faith N**. & Nyoni, Themba (2021) Alignments and Mismatches of Policies on Children with Learning Difficulties/Disabilities to Professional Practice Expectations in Zimbabwe: A Reality Check. American Journal of Educational Research. 9 (8) 465-471.

10. Shava G.N, Hleza S, **Tlou, F. N,** Shonhiwa S, Mathonsi, E. (2021) Qualitative Content Analysis, Utility, Usability and Processes in Educational Research. International Journal of Research and Innovation in Social Science 5 (7) 553-558.

11. **Tlou, F. N**. & Sibanda, Z. (2021) Concerns of Students on How Lecturers Assess Their Work in Teacher Education Colleges in Zimbabwe: Are Students Short-Changed in The Process? Journal of Arts & Literature 2(9) 1-7.

12. Shava G.N, **Tlou, F.N**, Shonhiwa, S Hleza, S. (2021) Quality and Education for Sustainable evelopment Challenges towards a Transition in Zimbabwean Higher Education.Indiana Journal of Humanities and Social Sciences 2(11) 17-28.

13 Shava, G. N. ; Hleza, S, Ndlovu M.J, Makokoro, P.P, **Tlou F**. N. (2022) Towards Achieving Quality in Distance Higher Education Teaching and Learning: Experiences from Zimbabwe. International Journal of Research and Innovation in Social Science 6(1)373-381.

14. Manokore, K., **Tlou, F. N,** Mkwelie, N., Phuthi, N., Shava, G.N., Mhlanga, E., Mangena, A., Sibanda, Z., Chasokela, D. (2022) Quality Higher Education for Sustainable Development: The Transition Towards Achieving Agenda 2030 Global Goals. International Journal of Latest Research in Humanities and Social Science 5(2) 9-21.

15. Shava, G. N., **Tlou F. N**, Shonhiwa. S. (2022) Grounded theory in Educational Research: A literature review of features and processes. International Journal of Advanced Multidisciplinary Research and Studies Grounded theory in Educational Research: A literature review of features and process 2 (1):198-205.

16. **Tlou, F.N.** (2022) Attainability of the quest for quality sustainable development goal 4 in the context of multiple challenging conditions in higher education in Zimbabwe. International Journal of Advanced Multidisciplinary Research and Studies 2(1):224-230

17. Mhlanga, E., **Tlou, F.N.,** Sibanda, Z. (2022) Challenges of Online Teaching and Learning in the Crisis of Covid 19 in Lupane Rural Schools in Matabeleland North in Zimbabwe. International Journal of Latest Research in Humanities and Social Science 5(3)1-8.

18. Sibanda, M., Ndlovu, M.J., Zulu, E., **Tlou, F. N,** Baya, C. (2022) Effects of corporate social responsibility on firm performance: Evidence from Zimbabwe. International Journal of Advanced Multidisciplinary Research. 9(3): 161-176.

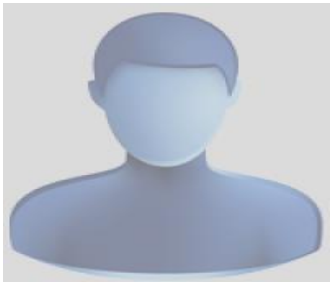
19. **Tlou, F.N**., Mhlanga, E., Sibanda, Z. (2022) Barriers to the Uptake of Renewable Energies in Institutions of Higher Education: Experiences from a Polytechnic in Zimbabwe. International Journal of Advanced Multidisciplinary Research and Studies. 2(2):370-374.

20. **Tlou, F.N**., Mhlanga, E., Ndlovu, M.J., Sibanda, Z. (2022) Reflections of video enabled ECD educator' practices in strengthening professional development. International Journal of Advanced Multidisciplinary Research and Studies 2(2):375-381.

21. Mhone, N., Ndlovu, M. J., Zulu, E., Masukume, C., **Tlou, F.N.** (2022) Is There a Solution to High Pricing of Primary and Secondary School Textbooks in Bulawayo. Journal: The Journal of Liberal Arts Education 1(3)1-8.

6. **Email**: faith.tlou@nust.ac.zw

Profile Picture



Lecturer: Kudakwashe Manokore

1. **Qualifications:** Master of Teacher Education (MTed) (UZ); Bachelor of Technical Education (Hons)(NUST); N.D Tech-Voc Education; N.D Textile Design; N.C Applied Art and Design (HEXCO).

2. **Skills and competencies:** Teaching; Supervision, Monitoring and Evaluation of undergraduate and postgraduate students research projects; Module Writing Setting, Administration, Invigilation and Marking of undergraduate and postgraduate examinations; Research; Communication; data analysis tools-SPSS &Excel; involvement in community services and development programmes; Drawing, Painting & Sculpting.

3. **Research Interests:** Assessment, Visual Aesthetics, Child Art Psychology and Development.

4. Research and Publications

1. **Manokore K**, Sibanda L., Shava G., Mangena A, Muzari T, Sibanda Z. and Mkwelie N. (2023) Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe, British Journal of Multidisciplinary and Advanced Studies: English Lang., Teaching, Literature, Linguistics & Communication, 4(5),1-20

2. Ruvengo. L,. Chingozha. P., Mkwelie. N., Gwebu., **Manokore K.,** & Muzari. T. (2022) Moving from the Edge to the Centre; the Role of ZimbabweHigher Education in Achieving Education for Sustainable Development: Addressing the Quality Iperative. International Research in Academic World. 1 (15)78-84 https://academicjournal.ijraw.com/
3. **Manokore, K.,** & Chiwiye, T. (2021). Teachers' Assessment Competencies: An Imperative for the Successful Implementation of Continuous Assessment (CA) in the Updated Zimbabwean School Curriculum. In F. Machingura & O. Hapanyengwi-Chemhuru (Eds.), Unpacking the Competence-Based Curriculum Framework (2015-2022) for Sustainable Development in Zimbabwe. (pp 209 – 223). Harare: The Academic Research Centre P.B.C
4. **Manokore . K** & Shava. G. (2021). Examining the Transformative Changes Introduced in Educational Assessment: Implications on sustainable development goals in Higher Education. International Journal of Research and Innovation in Social Science. 5(4) 105-111. www.rsisiinternational.org

5. Shava. G.N., **Manokore, K**., Mhlanga, E., Mpofu, M., Phuthi, N., Mkwelie, N., Mangena, A. (2021). Mainstreaming Education for Sustainable Development, The Transition Towards Achieving Sustainable Development Goal 4 On Quality in Higher Education. International Journal of Research in Education Humanities and Commerce. 2 (6) 69-88. http://www.ijrehc.com/currentissue.php
6. Shava, G.N., **Manokore, K.,** Mhlanga, E., Mkwelie, Phuthi, N., Mangena, A., Mpofu,Sibanda, Z., & Chasokela, D. (2021). Sustainable Development: The Transition towards Achieving Agenda 2030 Global Goals. International Journal of Latest Research in Humanities and Social Science IJLRHSS.5(2)09-21 www.ijlrhss.com

7. **Manokore. K**. Chiwiye. T. & Charumbira. G. (2016) Continuous Assessment (CA) Capacity Building Project for the Zimbabwe School Examinations Council (ZIMSEC) Staff and Teachers: Lessons Learnt. AEAA Journal of Educational Assessment in Africa, 11 (2016)200-218

5. Conference presentations

1. Continuous Assessment (CA) Capacity Building Project for the Zimbabwe School Examinations Council (ZIMSEC) Staff and Teachers: Lessons Learnt. AEAA Journal of Educational Assessment in Africa, Victoria Falls 2016.
2. Implementing Performance and Authentic Based Assessment on real performances in PESMD Displays practical components: A new experience for Zimbabwe School Examinations Council. SAEAA Botswana, 2019.
3. Teachers' Assessment Competencies: An Imperative for the implementation of Assessment Reform in the Updated Zimbabwean School Curriculum. AEAA Uganda, 2017.
4. Accounting for Qualitative Grade Threshold judgements of 'O' and 'A' Level Subject components by Zimbabwe School Examinations Council (ZIMSEC) Principal Marking Supervisors (PMS). AEAA Uganda, 2017.
5. Inclusivity and Sustainable Development: A Case for Zimbabwe Higher Education toward the Universal Design University (FSTE 2nd Annual Education for Sustainable Development Interdisciplinary Research Conference, 2022)

7. Email: kudakwashe.manokore@nust.ac.zw

Profile Picture

Lecturer: Zibulo Sibanda

1. **Qualifications:** PhD-Education (in progress) (University of KwaZulu-Natal, South Africa); Master in Technology Education (Applied Art and Design) (MTechED)-(National University of Science and Technology); Bachelor of Technical Education (Honours) Degree in Applied Art and Design (BTechEd-AAD)- (National University of Science and Technology); Diploma in Secondary Education-Art & Design and Geography (Hillside Teachers' College).
2. **Skills and competencies:** Teaching; Qualitative Researching; Graphic Designing; Guidance and counselling
3. **Research Interests:** Special Needs Education in Technical areas; Inclusive Education in Technical areas; Technical, Vocational Education & Training; Art and Design Education

4. **Research and Publications**

1. **Sibanda, Zibulo** & Sibanda, Lwazi (2022). Quality Art and Design Education among Physically Challenged Ordinary Level Learners at a Special Education Secondary School in Zimbabwe. *British Journal of Multidisciplinary and Advanced Studies: Education, Learning, Training & Development* 3(2),23-47. DOI: https://doi.org/10.37745/bjmas.2022.0055.
2. Tlou Faith Nomathemba & **Sibanda Zibulo** (2021). Concerns of Students on How Lecturers Assess Their Work in Teacher Education Colleges in Zimbabwe: Are Students Short-Changed in The Process? *Indiana Journal of Arts & Literature*. ISSN (Online)-2582-869X
3. Mhlanga Eliphine, Tlou Faith Nomathemba & **Sibanda Zibulo.** (2022).Challenges of Online Teaching and Learning in the Crisis of Covid 19 in Lupane Rural Schools in Matabeleland North in Zimbabwe. *International Journal of Latest Research in Humanities and Social Science (IJLRHSS).* www.ijlrhss.com || PP. 01-08.
4. Tlou, Faith Nomathemba Mhlanga Elphine & **Sibanda Zibulo.** (2022). Barriers to the Uptake of Renewable Energies in Institutions of Higher Education: Experiences from a

Polytechnic in Zimbabwe. *International Journal of Advanced Multidisciplinary Research and Studies.* ISSN: 2583-049X.

5. Faith N Tlou, Elphina Mhlanga, Mlisa Jasper Ndlovu, **Zibulo Sibanda.** (2022)**.** Reflections of video enabled ECD educator' practices in strengthening professional development. *International Journal of Advanced Multidisciplinary Research and Studies.* ISSN: 2583-049X.
6. K. Manokore, F. Tlou, N. Mkwelie, N. Phuthi, G. N. Shava, E. Mhlanga, A. Mangena, **Z. Sibanda**, D. Chasokela. (2021). Quality Higher Education for Sustainable Development: The Transition. Towards Achieving Agenda 2030 Global Goals. *International Journal of Latest Research in Humanities and Social Science (IJLRHSS).* Volume 05 - Issue 02, 2022 PP. 09-21.
7. E. Mhlanga, F. N. Tlou, G. Shava, N. Phuthi, K. Manokore, **Z. Sibanda**, D. Chasokela, M. Mpofu, L. Sibanda. (2022). Barriers to the Implementation of Agenda 2030 United Nations Global Goals in the Zimbabwean Higher. Education Context. *International Journal of Latest Research in Humanities and Social Science (IJLRHSS).* Article id HSS-1329.
8. Manokore K, Sibanda L., Shava G., Mangena A, Muzari T, **Sibanda Z.** & Mkwelie N. (2023) Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe, *British Journal of Multidisciplinary and Advanced Studies: English Lang., Teaching, Literature, Linguistics & Communication*, 4(5),1-20. doi: https://doi.org/10.37745/bjmas.2022.0286.

5. Conference Presentations

1. **Sibanda Zibulo** Conference Presentation Technical and Vocational Education and Training (TVET) Education for Sustainable Development (ESD) for the learners with disabilities in achieving Agenda 2030 Global Goals. The case of a Zimbabwean polytechnic college (2021). Faculty of Science and Technology Education (FSTE). National University of Science and Technology (NUST).
2. Kudakwashe Manokore, **Sibanda Zibulo**, Ntandoyenkosi Gwebu Conference Presentation Inclusivity and Sustainable Development: A Case for Zimbabwe

Higher Education Towards the Universal Design University. (2022). Faculty of Science and Technology Education (FSTE). National University of Science and Technology (NUST).

3. **Email**: zibulo.sibanda@nust.ac.zw

Profile Picture

Lecturer: Hahlani Onismo Stephen

1. **Qualifications:** Master of Education in Clothing and Textiles (MSU), Bachelor of Education in Clothing and Textiles (MSU), DipED Geography & Clothing and Textiles (MTC).
2. **Skills and competencies:** Team work, Accountability, Initiative, Interpersonal Communication, Ambition, Flexibility, Adaptability, Problem solving, Conflict resolution, Critical thinking, Decision making.
3. **Research Interests:** Sustainable teaching and Learning, 21st Teaching Methodologies, University teaching and learning, Design and Technology curriculum implementation.

4. **Research and Publications**

1. **Hahlani, O.S**, & Sithole, A. (2023) Encounters in sustainable new product design and development by Zimbabwean Design, Technology, and Engineering university students. International Journal of latest Technology in Engineering, Management & Applied Science.
2. **Hahlani, O.S,** Chigora, T. B, & Hove, B. (2023) Professional Learning Communities (PLCs) for the Zimbabwean Design and Technology High School Contexts: Ensuring

Quality Teaching through Effective Professional Development. International Journal of Research in Social Sciences. vol. 7, issue 6, 1462-1468

3. **Hahlani, O.S**, Sithole, S, & Shava, G, N. (2022) Sustainability through vegetable skin tanning in Mwenezi District in Zimbabwe: Opportunities and challenges. Indiana Journal of Humanities and Social sciences,3(12),12-20.
4. **Hahlani, O.S**, Bhukuvhani, C, & Sithole, S. (2022) An analysis of the Design Technology curriculum implementation at public universities in Zimbabwe. International Journal of Research and Innovation in Social Sciences (IJRISS). Vol VI, Issue XI, Nov 2022, Issn 2454-2454-6186.
5. Sithole, S, & **Hahlani, O.S.** (2022) Teacher concerns on the uptake of Auto-Cad in teaching of Building Drawing in Zimbabwe Secondary Schools: A case of Masvingo District. Indiana Journal of Arts and Literature, 3(10), 1-8.
6. G.N. Shava, T. Chasara**, O.S. Hahlani**. (2021) Sustainable development goal (SDG) 4 on quality in Education, Current Issues in Higher Education, Educating for the future. International Journal of Research and Innovation in social Science (IJRISS), Vol V, Issue VI, June 2021, Issn 2454-6186.

5. Conference presentations

1. **Hahlani, O.S.** (2022) Challenges in the use of information communication tools for teaching and learning of Textile Technology in Higher education in the context of Covid 19. A case of a Zimbabwean University. NUST 2nd ESDIR Conference 2022.
2. Sithole, S, & **Hahlani, O.S** (2022) Teacher Concerns on the uptake of Auto Cad in the teaching of building Drawing in Zimbabwean Secondary schools. A case of Masvingo District. NUST 2nd ESDIR Conference 2022.
3. **Hahlani, O.S**, Sithole, S & Shava ,G. N (2022) Skin remain polluting the environment whilst flesh is consumed. Opportunities, challenges and mitigation strategies for sustainable vegetable goat skin tanning for textile substrates manufacture. Evidence of Mwenezi district, NUST ESDIR 2nd Conference.
4. **Hahlani, O.S** (2022) An analysis of the design technology curriculum implantation at State Universities in Zimbabwe. NUST 2nd ESDIR Conference 2022.
5. **Hahlani, O.S,** (2022) Impediments faced in the adoption of telematic learning platforms by technical subjects' students during the Covid 19 pandemic era in the Zimbabwean Universities. NUST ESDIR 1st conference**.**

6. Email: onismo.hahlani@nust.ac.zw

DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION

BACKGROUND

Welcome to the Department of Science Mathematics and Technology Education (SMTE). This department is housed in the Faculty of Science and Technology Education at the National University of Science Technology (NUST). The Department was inaugurated in August 2014 with a staff complement of five lecturers, one teaching assistant and a student intake of 74. It is has grown into one of formidable departments within two years of its inception. The department offers Bachelor of Science Honours Degree in Education in the following subjects: Accounts and Business Studies, Biology, Chemistry, Computer Science, Mathematics and Physics. Additionally, the department offers Postgraduate Diploma in Science and Technology Education (PGDSTE) with duration of eighteen months and Master of Science Education in the following subjects: Accounts and Business Studies, Biology, Chemistry, Computer Science, Mathematics and Physics. Our degree programmes are tailored to meet the 5.0 model of Education whose end products are production of goods and services and industrialisation. The Department aims to produce quality STEM teachers who are able to **Think in other Terms** and service their communities diligently and honestly while upholding the values of NUST. The department is committed to ensure the utilisation of appropriate instructional methodology and relevant advanced technologies commensurate with technological changes. In addition, it aims to produce STEM classroom practitioners who are internationally recognised. Our very able and dedicated staff are committed to ensuring that each student achieves his or her full potential.

Vision

To be among the world leaders in producing STEM classroom practitioners of the highest calibre, capable of advancing knowledge and skills in STEM Education locally and beyond.

Mission

To provide expert tuition through innovative, research – based instruction in order to produce world class STEM classroom practitioners, who are equipped with cutting edge instructional skills and able to adapt to the ever changing technological trends.

Core Values

In addition to the Faculty core values, the department embraces the following principles:

- Excellence
- Teamwork
- Innovation
- Professionalism
- Commitment
- Ubuntu/Wunhu/Vumunhu
- Respect to diversity

DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY

EDUCATION

ZIMBABWE MINIMUM BODIES OF KNOWLEDGE AND SKILLS

A. UNDERGRADUATE PROGRAMMES (BSc ED) 2-year programme

1. Bachelor of Science Education (Hons) Degree in Accounting and Business Studies
2. Bachelor of Science Education (Hons) Degree in Biology
3. Bachelor of Science Education (Hons) Degree in Chemistry
4. Bachelor of Science Education (Hons) Degree in Computer Science
5. Bachelor of Science Education (Hons) Degree in Mathematics
6. Bachelor of Science Education (Hons) Degree in Physics

NAME OF PROGRAMME: BACHELOR OF SCIENCE EDUCATION (HONOURS) IN **ACCOUNTING AND BUSINESS STUDIES**

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**
ZNQF Level	8

Entry Requirements

Special Entry: Diploma in Education from accredited and recognised institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

LEARNING OUTCOMES

Holders of the BScEd (Hons) degree in Accounting and Business Studies will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Accounting and Business Studies curriculum
- Apply sound research and technological techniques when carrying out research in Accounting and Business Studies education.
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Accounting and Business Studies education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PST 1161 Microeconomics	12
PST1161 Principles of Management	12
PST1162 Microeconomics	12
PST1165 Financial Accounting I	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1261 Corporate and Business Law	12
PST1162 Macroeconomics	12
PST1263 Financial Accounting II	12
PST1264 Introduction to Taxation	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PST2161 Human Resources Management	12
PST2162 b Management and Cost Accounting I	12
PST2164 Financial Reporting	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24

PST2103 Advanced Pedagogics in Accounting and Business Studies	12
PST2308 Educational Management	12
PST 2261 Organisational Behaviour	12
PST2262 Strategic Management	12
PST2362 Management and Cost Accounting II	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

NAME OF PROGRAMME BACHELOR OF SCIENCE EDUCATION (HONOURS) IN

BIOLOGY

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**
ZNQF Level	8

Entry Requirements

Normal Entry: Diploma in Education from accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A **LEARNING OUTCOMES**

Holders of the BScEd (Hons) degree in Biology will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Biology curriculum
- Apply sound research and technological techniques when carrying out research in
- Biology education
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Biology education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PST1135 Cell Biology	12
PST1136 Biochemistry	
PST1138 Diversity of Life 1	
Semester 2	

PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1235 Plant physiology	12
PST1238 Genetics	12
PST 1239 Diversity of life II	12
PST 1335 Microbiology	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PST2135 Biomathematics	12
PST2138 Animal physiology	12
PST2235 Biotechnology	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST 2308 Educational Management	12
PST2335 Ecology	12
PST 2236 Mycology	12
PST2337 Biology Lab Practice and Techniques	12
PST2703 Advanced Pedagogics in Biology	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

NAME OF PROGRAMME BACHELOR OF SCIENCE EDUCATION (HONOURS) IN

CHEMISTRY

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	192
ZNQF Level	8

Normal Entry : Diploma/Certificate in Education or equivalent from an accredited and recognized institution, in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Special Entry: N/A Mature Entry:N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the BScEd (Hons) degree in Chemistry will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Chemistry curriculum
- Apply sound research and technological techniques when carrying out research in Chemistry education
- Monitor, assess and evaluate learners, learning processes, project and programmes related to chemistry education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12

PST1163 Entrepreneurship and Financial Management	12
PST1142 General Chemistry	12
PST1143 Polymer and Polymerisation	12
PST1144 Inorganic Chemistry	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1240 Chemical Energetics	12
PST1243 Analytical Chemistry	12
PST1244 Physical Chemistry	12
PST1342 Transition Metal Chemistry	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PST2041 Industrial Chemistry	12
PST2042 Organic Chemistry	12
PST2043 Environmental Chemistry	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PST2303 Trends and Pedagogics in Chemistry Education	12
PST2244 Chemistry Laboratory Practice and Techniques	12
PST2343 Electrochemistry	12
PST2343 Nanochemistry	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

NAME OF PROGRAMME: **BACHELOR OF SCIENCE EDUCATION (HONOURS) IN COMPUTER SCIENCE**

Duration: 2 years
Minimum Credit Load: 240

Maximum Credit Load: 300

Maximum

MBKS Credit

Load: 192 ZNQF

Level: 8

Entry Requirements

Normal Entry: Diploma in Education from accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A LEARNING OUTCOMES

Holders of the BScEd (Hons) degree in Computer Science will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Computer Science curriculum
- Apply sound research and technological techniques when carrying out research in Computer Science education
- Monitor, assess and evaluate learners, learning processes, project and programmes related to Computer Science education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions

- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PST1133 Mathematical Foundations of Computer Science	12
PST1171 The History and Philosophy for Computer Science	12
PST 1275 Introduction to Computer Science	12
Level Two	
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1276 Physics for Computer Science	12
PST1277 Business Information Systems	12
PST1278 Operating Systems Concepts	12
PST1279 Visual Programming Concepts and Development	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12

PST2105 Testing, Assessment and Evaluation	12
PST2179 Software Engineering	12
PST2176 Database Concepts and Data Processes	12
PST2175 Object Oriented Programming I	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PST2275 Computer Communication and Networking	12
PST 2277 Data Structures and Algorithms	12
PST2404 Advanced Pedagogics in Computer Science	12
PST2279 Internet and Web Designing	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

NAME OF PROGRAMMEBACHELOR OF SCIENCE EDUCATION (HONOURS) IN **MATHEMATICS**

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	192
ZNQF Level	8

Entry Requirements

Special Entry: Diploma/certificate in Education or equivalent from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A **LEARNING OUTCOMES**

Holders of the BScEd degree in Mathematics will be able to:

1. Use innovative technology-enhanced teaching strategies to implement the Mathematics curriculum
2. Apply sound research and technological techniques when carrying out research in Mathematics education
3. Monitor, assess and evaluate learners, learning processes, project and programmes related to mathematics education.
4. Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
5. Adapt to educational changes in their environments to promote innovation and industrialisation
6. Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
7. Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.
Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PST1233 Probability Theory and Statistics	12

PST1331 Calculus	12
PST1130 Linear Mathematics	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1232 Discrete Mathematics	12
PST1234 Ordinary and Partial Differential Equations	12
PST1333 Linear Programming	12
PST1332 Numerical Methods	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PST2030 Vector Calculus	12
PST2031 Analysis	12
PST2034 Statistical Inference	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PST2330 Mechanics	12
PST2334 Algebra	12
PST2503 Advanced Pedagogics in Mathematics	12
PST2233 Linear Models	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

NAME OF PROGRAMME BACHELOR OF SCIENCE EDUCATION (HONOURS) IN **PHYSICS**

Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	**300**
Maximum MBKs Credits	**192**
ZNQF Level	8

Entry Requirements

Normal Entry : Diploma/certificate in Education or equivalent from accredited and recognized institution, in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Special Entry: N/A
Mature Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the BScEd (Hons) degree in Physics will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Physics curriculum
- Apply sound research and technological techniques when carrying out research in Physics education
- Monitor, assess and evaluate learners, learning processes, project and programmes related to physics education.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PST1130 Linear Mathematics	12
PST1131 Calculus 1	12
PST1172 Electricity and Magnetism	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PST1270 Thermal Physics and Wave Motion	12
PST1272 Mechanics and Oscillations	12
PST1273 Atomic and Laser Physics	12
PST1370 Statistical Physics	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PST2170 Quantum Physics 1	12

PST2173 Electronics 1	12
PST2174 Optics and Modern Physics	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PST2270 Nuclear Physics	12
PST2274 Physics Laboratory Practice and Techniques	12
PST2370 Electromagnetism	12
PST2603 Advanced Pedagogics in Physics Education	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

COURSE SYNOPSES

PST1112 ICT Application in Education 12 Credits

This module seeks to equip students with skills of improving learning and teaching through the use of various instructional media that include audio visual communication. The module will also familiarise students with different computer software including Ms Word, Ms Excel, Ms Access, PowerPoint and the Publisher. Upon completion of the module students should be able to design and use instructional media, create data bases and tables, query information from tables, open/close files and directories, analyse students' performance using the Excel formulas and research from the internet.

PST1118 Culture and Heritage Studies 12 Credits

This module will introduce scholars to definition terms of culture and heritage. The module will expose the learners to issues like civic education, spirituality, tangible and nontangible Zimbabwean resources. History of Zimbabwe and its different ethnic groupings in different geographical locations. Learners would be challenged to be tolerant and enjoy the multicultural status of the nation.

PST1163 Entrepreneurship and Financial Management 12 Credits

The courses give basics on how business is managed from a small scale to high scales. The module will expose the learners to various business models and financial management systems that can be used to start and sustain business projects. Marketing strategies will also form part f this module.

PST 2105 Testing, Assessment and Evaluation 12 Credits

The module focuses on the purposes and methods of assessment; formal/informal; formative/summative; norm/criterion referenced; objective/subjective; characteristics, strengths and weaknesses of a range of testing methods, examinations: processing and administration; item writing; examination results grading systems; item analysis; examination boards: HEXCO, ZIMSEC, etc; standardized tests; continuous and terminal assessment; portfolio and project assessment; the effects of assessing learners and teachers; evaluation; selecting and using appropriate approaches and tools for evaluating the effectiveness of learning sessions and programmes; quality control techniques and accreditation; trade testing and competency-based testing.

PST1204 Curriculum Development and Evaluation 12 Credits

This module explores the curriculum terminology and concepts; ideology and philosophy underpinning curriculum planning, development and evaluation; curriculum needs assessment model; the impact of social, economic, political, technological, psychological, philosophical and cultural, environmental influences on the curriculum; process and product models of curriculum development; objectives models e.g. Tyler, Wheeler; decision-making models e.g. Stufflebeam (CIPP); Designing/developing, delivering and evaluating a curriculum; curriculum change and innovation; strategies for change (Havelock's RD&D, SI, PS, L); evaluating the overall effectiveness of curricula; curriculum evaluation models; course design and production, varying modes of delivering the curriculum, including flexible, distance, open and resource-based learning, and independent study. Examples of curriculum projects in Zimbabwe and internationally and concept maps and hierarchies, concept analysis as well as the roles of CRADU, CDU, RCZ, SIRDC will be explored.

PST 3000 Work-Based Experience 12 Credits

This module is on monitoring, assessment and evaluation of students' teaching in their respective work places by tutors and local supervisors. Students will produce a file, a log book and a written report on their experiences in their workplaces for their terminal assessment.

PST1101 Theoretical Foundations in Stem Education 12 Credits

The module focuses on psychology of education- Physical, cognitive and emotional development in children, adolescents and adults. Piaget, Brunner, Pavlov, Vygotsky, etc; Individual differences and learning styles; Pedagogy and andragogy; memory and understanding; Sociology of education- Human Social Interactions; society and community; urban and rural communities, agents of socialization; culture and education, inclusive learning; industrialization; globalization, citizenship; Durkheim, Weber, Mead, etc; Philosophy of education– theory and practice; trends in philosophy of education, humanism, progressivism, reconstructionism, empiricism, modernism, structuralism, critical theory, hermeneutics, constructivism, phenomenology; Rousseau, Karl Marx, John Dewey and Vygotsky, etc.

PST 2210 Final Year Project 24 Credits

This is a theoretical research, experimental or design project in the specialist subject of the candidate. The project counts as two taught courses and will be carried out during the whole final year. The research project enables the students to sharpen their research skills and at the

same time apply the content learnt during the studies. Students present a research project proposal at a fora, carry out experimental work, present the research results and finally write a research project. The course demands that the student exhibits some knowledge on topic selection, methodology, literature review, data presentation and analysis.

PST 2308 Educational Management 12 Credits

The course deals with issues related to educational management as they affect teachers. It seeks to highlight and evaluate the role of different educational managers at different educational levels and their implications on the production of quality education. The topics covered include: The meaning of educational management, Historical development of educational management, Theories of educational management and Leadership, Types of educational management, Organizational Climate and Culture in Educational institutions; Functions and implications of educational management, Organisational and administrative structures in education.

ACCOUNTING AND BUSINESS STUDIES SPECIALIST COURSES

PST 1160 Financial accounting I 12 Credits

The course focuses on the principles and techniques of financial accounting and their application to the preparation of financial statements of the sole traders, partnerships, limited companies and non-profit making organisations. The role of the International Accounting standards and how to interpret them. Other topics to be covered include partnerships (excluding partnership changes), cash book, bank reconciliations, presentation of financial statements, revenue, property plant and equipment.

PST 1161 Principles of management 12 Credits

The course explores the development of management as a function in business, organizational structures, decision making, communication, centralization and decentralization, delegation and leadership controlling and budgetary and non-budgetary controls. The role of operations management in the organization is also explored.

PST 1162 Microeconomics 12 Credits

This course explores microeconomic issues and problems, competition and monopoly, pricing, consumer demand, and producer supply; theoretical framework for microeconomic analysis; applying theory to practical domestic and international economic policy problems; introduction to supply and demand and the basic forces that determine equilibrium in a market economy, learning about consumer behaviour and analysing consumer decisions; firms and their decisions about optimal production, and the impact of different market structures on firms' behaviour; introduction to more advanced topics that can be analysed using microeconomic theory, e.g. international trade, the impact of uncertainty on consumer behaviour, the operation of capital markets, equity vs. efficiency trade-offs in economic policy and social insurance; introductory microeconomic theory, solving basic microeconomic problems, policy questions relevant to the operation of the real economy.

PST 1261 Corporate and business law 12 Credits

The course explores the role of law in a system of governance, sources of law, contracts, case, agency, corporate governance and ethics, economic, political and legal systems, obligations and risk contracts for obligation sales. Organization as a legal persona

PST 1262 Macroeconomics 12 Credits

The course covers fundamental macroeconomic ideas: definition of macroeconomics, major macroeconomic issues, national accounts, simple theory of national income distribution, national income in an open economy, changes in the demand side, the multiplier process, supply side equilibrium, role of money in macroeconomics, monetary policy, bank rate open market operations, variable reserve ratios, moral suasion, international trade and balance of payment theories, foreign exchange markets, consumption theories, investment theory.

PST 1263 Financial accounting II 12 Credits

The course builds on the foundation laid by Financial Accounting I, partnership conversion to a limited company, understanding the nature of current accounts for individual partners, published accounts, and comprehensive statement of cash flows, events after the reporting period. The course also aims at exposing students to more accounting standards so as to interpret and apply them in various scenarios, financial analysis, ratio analysis and capital budgeting.

PST1264 Introduction to Taxation 12 Credits

The role of tax in an economy; the application of the Income tax Act section relevant to an individual and employment income. Allowable deductions: deferred tax, IAS12, computation of personal and corporate taxation; individual tax; gross income, gross income special inclusions, exemptions, allowable deductions, employees' tax and provisional tax; trade, consumption taxes (VAT), stock, capital allowances, capital gains tax. All topics are taught at a basic level to introduce students to income tax legislation.

PST 2161 Human resources management 12 Credits

The operative function of the human resources management, the role of the labour act, bargaining power of labour. Labour as a factor of production. It involves leadership, values, employment planning, recruiting and selecting employees, training and compensating them, and evaluating their performance. It also significantly influences the corporate culture.

PST 2163 Management and Cost accounting I 12 Credits

The course aims at providing an understanding of the principles, concepts and techniques of management and cost accounting and helps the students develop an ability to apply this knowledge to practical situations. Cost control and computation.

PST 2261 Organisational Behaviour 12 Credits

The focus is on contemporary issues which include, inter alia : foundations of behaviour in organisations, productive and counterproductive workplace behaviours, organisational culture and climate, organisational ethics, organisational structures and designs, the learning

organisational model, leadership and power, managing organisational change, motivating employees decision making, managing conflicts, stress and politics in organisation.

PST2362 Management and Cost Accounting II **12 Credits**

This course is a continuation of Management and Cost Accounting I and the topics include standard costing, Economic order quantity, budgeting as well as Capital budgeting.

PST2103 Advanced Pedagogics in Accounting and Business Studies **12 Credits**

This course is designed to meet practical needs of in- service classroom Accounting and Business Studies teachers. The purpose of the course is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology course on becoming science teachers. The course focuses upon classroom techniques, instructional procedures and languages, and teacher/learner interactions. Microteaching sessions focusing on teaching 'A' level Accounting and Business Studies will be conducted**.** The course guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about school curriculum.

PST2262 Strategic Management **12 Credits**

The study of strategy formulation, the role of the mission and vision of the organization, decision making in the face of changing conditions. Organisational culture, change management and adaptation to technology. A view of effective administration of organizational process affecting behaviour. Michael Porter's five forces model and various strategies that may be taken by the by the organization.

BIOLOGY SPECIALIST COURSES

PST 1135 Cell Biology **12 Credits**

The purpose of the course is to introduce molecular and structural organization of prokaryotes and eukaryotes to undergraduate Biology student teachers. The cell is the basic unit of all living organisms and thus the course provides a foundation to the study of Biology. The module looks at microscopic techniques, typical plant and animal cell ultra-structure, cell organelles, eukaryotic cells, fluid-mosaic model of cell membrane, cell transport processes and water potential.

PST1136 Biochemistry **12 Credits**

The course provides students with the necessary background to understand the basic molecular logic of living organisms. It surveys the structure, function, and metabolism of water, amino acids, proteins, carbohydrates, lipids, and nucleic acids. The course prepares students for other courses such as Biotechnology and Genetics.

PST1138 Diversity of Life I

The course introduces students to diversity and evolution of life while providing a more specialized understanding of biology at the level of the organism. The course qualifies students for specialization in all fields of biology, including biodiversity, botany, zoology, and other life sciences and provides a sound science background for students wishing to pursue professional life science degrees or careers in teaching, government service or the private sector.

PST1235 Plant Physiology **12 Credits**

This course aims to give students a greater appreciation of the plant world we depend on and to stimulate student learning of basic concepts in plant and biological science provides an introduction to basic principles of plant function, primarily covering physical processes in plants, metabolism, secondary products, cell physiology, and introducing principles of growth and development. The course includes, Plant growth substances and mechanism behind their effects on cell and gene level, external factors controlling plant growth: light, temperature, gravitation: phototropism, photomorphogenesis, photoperiodism, vernalisation, gravitropism: the biological clock. Photosynthesis: light absorbing pigments, light reaction, light quality, effects of UV light, oxidative stress, C3-, C4- and CAM metabolism, photo respiration. Metabolism: turnover of C, N, P, S, etc. ways of synthesis, free-living and symbiotic nitrogen-fixing organisms. Stress: defence mechanisms in plants, herbicides, secondary metabolites, effects of UV-B. The following is also treated: Transport and translocation mechanisms of water, ions and solutes, respiration, phloem transport, mycorrhiza relationships.

PST1238 Genetics **12 Credits**

The course is designed to introduce students to classical genetics (the rules by which genes are transmitted), as well as molecular genetics (the structure of DNA and how it directs the structure of proteins). In this course students will have to solve work problems, think experimentally, and make decisions about the information they will have learned. Skills learned in this course will be broadly applicable in other disciplines. Course components include, Basics of the structure, and function of nucleic acids; Basics of DNA replication in prokaryotes and eukaryotes; Laws of heredity and how they can be used in basic and applied research; Genetic crosses; Nature of hereditary systems given the results of genetic crosses; How genes are packaged with proteins in the form of chromatin; Gene mapping and its significance, including how genes are mapped both genetically and physically; Gene variation occurs and how populations maintain or lose genetic diversity, including how selected mutagens change DNA sequences; Changes in chromosome structure and number and describe the significance of these changes; Genetic variation in populations as well as the factors which effect this variation; Genetics of populations change over time; Nature of continuously varying traits; Laboratory skills; Collection, analysis and presentation of scientific data

PST 1239 Diversity of Life II **12 Credits**

The topics for the course includes; Theories of evolution; Evolutionary processes through which biological diversity originates and is interrelated, Classification of organisms; Key families of organisms; Meaning and significance of biodiversity and current issues surrounding it, Complexity of organisms and the importance of physical organization and regulatory processes, and the Nature of interactions among organisms and between organisms and their biotic and abiotic environments.

PST 1335 Microbiology **12 Credits**

The course introduces students to microbes, their processes, interactions and the techniques scientists use to study them. It covers: the biology, diversity and function of microorganisms; comparative aspects of microbial growth and metabolism; microbial survival and control; action of antimicrobial agents. Practical aspects of microbiology, such as environmental, food and medical microbiology will also be introduced. Course includes, General characteristics of archaea, bacteria, fungi and viruses; Ubiquity of microorganisms; Roles of microorganisms in terrestrial and aquatic ecosystems, including nutrient cycling and symbiotic relationships; Microbial reproduction, including microbial genetics; Major industrial products produced by microbes; Basic physical and chemical methods for controlling microbial growth; Importance of aseptic technique and demonstrate aseptic technique in the laboratory; Basic microbiological laboratory methods such as culturing, staining and microscopic observation.

PST 2137 Biomathematics **12 Credits**

The course extends the range of usage of mathematical models in biology, ecology and evolution. Biologically, the course looks at models in evolution, population genetics and biological invasions. Mathematically the course involves the application of multivariable calculus, ordinary differential equations, stochastic models and partial differential equations.

PST 2138 Animal Physiology **12 Credits**

This course will examine the function of tissues, organs, and organ systems, with an emphasis on the relationship between structure and function in animals. From the level of the cell, the course will dwell on bodily processes including respiration, circulation, digestion and excretion. In addition, the course will address how different organisms regulate these complex processes and how ion and fluid balance is maintained. We will also study the nervous system in the context of stimuli transmission, focusing on how the action potential is generated and propagated between neurones. Course includes, Digestion; Circulation; Respiration; Excretion; Nervous control; Endocrinology. hormonal regulation: metabolism and appearance of hormones, effects on cell and gene level, mechanism behind the hormone effect; external factors controlling animal growth

PST 2235 Biotechnology **12 Credits**

Biotechnology engineering is a branch of applied biology and chemical engineering standards that includes the utilization of living things in technology, engineering, medicine, and various useful applications. It also includes genetic engineering as well as cell and tissue culture technologies. Biotechnology is an accumulation of consolidated technologies applied to living cells for production of a specific product or upgrading its quality. This might involve domestication of animals, cultivation of plants and improvements through breeding, artificial selection, and hybridization.

PST 2236 Mycology

The course focuses on the kingdom Fungi from its diversity, classification, nutrition and interactions with other microorganisms. It also looks at its beneficial environmental effects as well as its medical importance. Industrial production and use in production of vaccines, dairy products and in the baking industry. Mycology and genetic engineering will also be covered

PST 2337 Biology Laboratory Practice and Techniques **12 Credits**

The purpose of the course is to equip Undergraduate students in the Bachelor of Science Education degree in Biology with laboratory and practical skills and prepare them to teach to Advanced Level Biology practicals with confidence. The course introduces the student to experiments which require students to apply their knowledge of enzymes, diffusion, osmosis, cellular respiration, fermentation, mitosis, meiosis, genetics, bacteriology, and protist biology. The course also provides students with a comprehensive coverage of major practical elements in cell structure and function, transport and exchange, control of internal environments, nervous systems, movement, cell division, growth & reproduction and genetics. In addition, the course provides a comprehensive coverage of some aspects of data handling, analysis and interpretation

PST 2335 Ecology **12 Credits**

This course will introduce students to ecosystem processes and functions; the soil, plants, animals, microorganisms and their interconnectedness. The main relationships and interactions between biotic and abiotic components of ecosystems will also be introduced. Course includes, Definitions of ecology and ecosystems, Major ecological zones of the world and the role of anthropogenic interference within natural ecological systems; Nature and scope of ecology; Levels of ecological organization: individuals, populations, communities and ecosystems; Population ecology; Community ecology; The ecosystem; Soil ecology; Human impacts on ecosystems.

PST 2703 Advanced Pedagogics in Biology **12 Credits**

This course is designed to meet practical needs of in- service classroom science teachers. The purpose of the course is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology course on becoming science teachers. The course focuses upon classroom techniques, instructional procedures and languages, and teacher/learner interactions. Microteaching sessions focusing on teaching 'A' level biology will be conducted. The teachers need to share challenges, useful ideas, suggestions, demonstrations, and examples of teaching science. They need to update their classroom practices to be consistent contemporary trends in science teaching, but which context and culturally sensitive. The course guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about school curriculum.

CHEMISTRY SPECIALIST COURSES

PST1142 General Chemistry 12 Credits

This module explores the origin of quantum mechanics in describing elements: atomic structure; hybridisation; chemical bonding; lattice energy. Elementary treatment of analytical data.

PST1143 Polymer and Polymerisation 12 Credits

The module looks at addition polymerization as well as condensation polymerization. Polymerisation techniques, Solution properties of polymers: Polymer structures; Molecular weight averages.

PST1144 Inorganic Chemistry 12 Credits

The module focuses on: Group I-the alkali metals; Group II – the alkaline earth elements; General trends in the periodic properties of the p-block elements; Group III elements; Group VI elements; Group VII elements; Group VIII elements

PST1240 Chemical Energetics 12 Credits

This module covers enthalpy changes: ΔH of formation, combustion, hydration, solution, neutralisation, and atomisation; bond energy; lattice energy and electron affinity. Composition of solutions.

PST1243 Analytical Chemistry 12 Credits

This course looks at applications of analytical chemistry to various branches of science. Techniques of chromatography and the various applications in day to day life. Principles of spectroscopic methods: Molecular spectroscopy; Molecular UV-Vis; Atomic absorption; Atomic emission spectroscopy. H-NMR and C-NMR; UV analysis; IR analysis. Electrochemical methods

PST1244 Physical Chemistry 12 Credits

This module exposes students to Chemical Thermodynamics: First and Second law of thermodynamics; Equilibrium and equilibrium expressions; Reaction Kinetics; Quantum Mechanics: Dynamics microscopic systems; Applications of quantum theory; Rotational and vibrational spectroscopy; Electronic transitions.

PST1342 Transition Metal Chemistry 12 Credits

This module examines the general physical and characteristic chemical properties of the first set of transitional elements, titanium to copper. Coordination Chemistry: Colour; Magnetic

properties; Differences between the first row on one hand and the second and third rows on the other.

PST2041 Industrial Chemistry 12 Credits

The module examines the development, optimization and monitoring of various chemical processes used in industries such as: Manufacturing and Processing industries; Petroleum, Chemical, Ceramic, Polymer, Food, Electronics, the Environmental, Mining, Pharmaceuticals and health-related industries, Agriculture industries, Government agencies, including Forensic science and Patents, Defence, Education and research; Biotechnology.

PST2042 Organic Chemistry 12 Credits

In this module, focus is on stereochemistry and its consequences on chemical reactivity; optical activity and separation of enantiomers; bonding, structure, nomenclature and reactivity of functional groups, functional groups interconversions of aliphatic compounds; aromaticity and its consequences on chemical reactivity. Aliphatic systems chemistry: Alkanes and Cycloalkanes; Alkenes; Alkynes; Organic Halogen Compounds; Benzene; Alcohols and Phenols; Carbonyl Compounds; Carboxylic Acids; Grignard reagents and electrophiles; Reactions with compounds containing C + N and – CN; Reactions with alkenyl, alkynyl, conjugate C = C – C and allylhalides; Alkylation and alylation – claisen condensation; Condensation reactions: self-aldol and Mixed - Claisen-Schmidt;

PST2043 Environmental Chemistry 12 Credits

The module focuses on: Atmospheric chemical reactions and Calculations; Atmospheric aerosols; Distribution of elements or compounds in aquatic system; Environmental issues related to aqueous organic matter; Chemical methods used to treat waste water; Chemistry of solid wastes; Chemistry of biocides.

PST2343 Nanochemistry 12 Credits

This module explores the significant role nanochemistry plays in the emerging interdisciplinary fields of nanoscience and nanotechnology: nanoscale; Properties and behavior of Nanomaterials; Existing nanotechnology; Preparation; Tools to study nanomaterials.

PST2244 Chemistry Laboratory Practice and Techniques 12 Credits

This module emphasizes on: Good laboratory practice and safety; Basic laboratory techniques used in Chemistry enquiry; The scientific method to communicate findings.

PST2303 Trends and Pedagogics in Chemistry Education 12 Credits

This module focuses upon trends: real classroom experiences on pedagogies, teaching and learning contexts, classroom activities, language of subject and instructions, teaching materials, enhancing classroom practice effectiveness; pedagogics: classroom techniques, instructional procedures and languages, teacher/learner interactions; challenges, ideas, suggestions,

demonstrations, and examples of teaching science; updated context and culturally sensitive classroom practices- trends in science teaching; chemistry curriculum.

PST2343 Electrochemistry 12 Credits

This module focuses on oxidation-reduction reactions; galvanic/ voltaic cells and electrode potentials; Cell potential, electrical work and free energy, the Nernst equation and equilibrium constants; Batteries; Fuel cells; Corrosion; electrolytic cells.

COMPUTER SCIENCE SPECIALIST COURSES

PST1171 The History and Philosophy for Computer Science 12 Credits

The purpose of this course is to examine the historical and philosophical development of modern Computer Science and how that history shapes the approaches that Computer Science teachers use/choose in their classroom practice. The course aims to enhance students' understanding of the history and philosophy of computer science. Basically, the course addresses the metaphysical, epistemological and ethical issues around teaching computer science. The course introduces students to Philosophical underpinnings and their relevancy to Computer Science. In a similar fashion the course looks at Computer science founding fathers, Evolution of Programming Languages and Computer Generations. The last part concludes with the merging of the above and applicability in the classroom.

PST1133 Mathematical Foundations of Computer Science 12 Credits

Fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science. Topics include logic and Boolean circuits; sets, functions, relations, databases, and finite automata: deterministic algorithms, randomized algorithms, and analysis techniques based on counting methods and recurrence equations; trees and more general graphs. At the end of the module, the student should be able to formulate logic expressions for a variety of applications; convert a logic expression into a Boolean circuit, and vice versa; design relational databases; design finite automata to recognize string patterns; apply, adapt, and design elementary deterministic and randomized algorithms to solve computational problems; analyse the running time of non-recursive algorithms with loops by means of counting; analyse the running time of divide-and-conquer recursive algorithms by means of recurrence equations; and use trees and graphs to formulate computational problems.

PST1275 Introduction to Computer Science 12 Credits

This course outlines information Society, History of Computers; Data and Information; number system and arithmetic; data representation; basic computer components:-CPU, I/O units; Storage; Brief concepts of computer language and programming techniques; high/low level languages, compiler, interpreter, grammar, recursion, simple data structures (array, lists, trees, hash tables, queues & stacks) problem solving; Algorithms: Sorting, compression, numerical and encryption, operating system and its function:- process and memory management, I/O, data communication job control; Processing:-File structures, organization and access, databases;

Fundamentals of Network, a simple program, initialization, printing, comments, keyboard, constants, assignments and expressions.

PST1276 Physics for Computer Science 12 Credits

The course equips the students with physics knowledge and skills that is used in the field of Computer Science. The module covers topics such as elements in mechanics, electrostatics, conductors and insulators, DC circuits and magneto statics, electromagnetic induction, and AC circuits and RCL circuits.

PST1277 Business Information Systems 12 Credits

The course looks at the business environments; organizations as systems: goal setting and decision making; IT strategy and information systems objectives; Frameworks used for analysis organizational systems; Types of information system: transaction processing, operational control, MIS, DSS and Expert Systems; The process of system development: the systems of life cycle, the phases within it and the activities and documentation appropriate to each phase; Other development strategies include 4GLs, prototyping and evolutionary development; The anatomy of a system: project organization and project management; The analysis and design of information systems, physical of information systems and implementation and post implementation activities.

PST1278 Operating Systems Concepts 12 Credits

The course gives an overview of operating systems, operating system organization and services, computer design, the hardware and its interface, device management, I-O management: creating virtual device abstractions, Support for processes and threads, job scheduling, disk scheduling, file system; Protection(privacy) and security, process management, synchronization, file management, filing systems, interface and implementation; Backup and archiving, distributed operating systems and file systems; Case studies drawn from UNIX, MS-DOS, File and directory structure and Data transmission.

PST1279 Visual Programming Concepts and Development 12 Credits

Object oriented programming II aims to introduce students to the concept of OOP. Also, to introduce students to the C++ language and to train students to develop applications in C++.

PST2179 Software Engineering 12 Credits

This module is an introduction to software engineering in industry, with emphasis on understanding the nature of software engineering, the software engineering process, and the problems and solutions manifest in real software development and modification projects. Different models of the software engineering process are compared and contrasted. Current best practices in software engineering and various approaches to software process improvement are presented. This module is intended for students who have not received prior instruction in software engineering.

PST2176 Database Concepts and Data Processes 12 Credits

The module looks at database terms; Database management systems (DBMS), database models: Entity-relationship model; Database security; The relational model, comparison of files and database systems; The SQL language, database design, ER or relational mapping, normalization, aspects of physical database access: database transactions, embedded SQL(PL/SQL) , cursors, distributed databases; Client-server database systems, Higher-level and extended data models, Object-oriented data models are introduced; SQL3 and requirements of multimedia databases.

PST2175 Object Oriented Programming I 12 Credits

Object oriented programming II aims to introduce students to the concept of OOP. Also, to introduce students to the C++ language and to train students to develop applications in C++.

PST2210 Research Project 24 Credits

In the final year of their studies students carry out a research in a subject related area. The research project enables the students to sharpen their research skills and at the same time apply the content learnt during the studies. Students present a research project proposal at fora, carry out experimental work, present the research results and finally write a thesis. At the end of the projects, students are expected to have acquired the research skills and learnt presentation and project proposal writing skills

PST2278 System Analysis and Design 12 Credits

This module gives an overview of system development life cycle, structured analysis and design, business systems and computer resources; Analysis phase and ad techniques used, data dictionaries, DFDs, database definitions and system maintenance, project planning and control; Think in other terms communication; Documentation and its standards; System security and integrity; prototyping and case studies of practical systems project.

PST2275 Computer Communication and Networking (Elective) 12 Credits

The module is on keeping information safe, active and passive attacks, digital signatures and cryptographic checksums, countering digital forgery and ensuring integrity; Types of networks; network topologies; network device types and characteristics and media access; Networking technology overview, End-to-end protocols; the Internet protocol Suite overview; UDP, TCP – connection established and adaptive retransmission, RPC; Congestion control, Resource allocation, Network performance and network management.

PST2403 Advanced Pedagogics in Computer Science 12 Credits

This module is designed to meet practical needs of in-service classroom science teachers. The purpose of the module is to reflect on real classroom situation in comparison to theoretical, perspective taken in methodology module on becoming Computer Science

teachers. The module focuses upon classroom techniques, instructional procedures, and teacher/learner interactions. The teachers need to share challenges, useful ideas, suggestions, demonstrations, and examples of teaching science. They need to update their classroom practices to be consistent contemporary trends in science teaching, but which context and culturally sensitive. The module guides the teachers in developing research and reflective practices drawn from their experiences and beliefs about mathematics.

PST2277 Data Structures and Algorithms 12 Credits

The module focuses on problem solving, algorithms, compilation, variables, I/O, control structures, data structures, subprogram, files, data types, storage elements, control constructs, procedures, parameter passing and results, recursion, functional, imperative and logical programming, scope rules, extensibility, data structures:-pointers, linked lists, queues, stacks, tree and operations on them, divide and conquer, backtracking, space/time, trade-offs, data abstraction, sorting, hashing; System design approaches and computer arithmetic errors.

PST2279 Internet and Wed Designing 12 Credits

The course seeks to equip the students with the knowledge and skills of internet and web design using Hyper Text Markup Language (HTML), Dynamic Web content development with PHP, PHP file includes, Development of PHP Web applications, Python scripts, Web security and Web content management systems. The module covers basic web design using HTML and Cascading Style Sheets (CSS), planning and designing of web pages; enhancing the web pages with the use of page layouts techniques, text formatting, inclusion of graphics, images and multimedia, and producing a functional multi-page website.

MATHEMATICS AND STATISTICS SPECIALIST COURSES

PST1130 Linear Mathematics 12 Credits

The course looks at the complex numbers: geometric representation and algebra of complex numbers; De Moivres theorem polynomials and roots of polynomial equations, Roots of complex numbers; Matrices: Algebra of matrices, trace, rank of a matrix, determinants, inverses, row operations, solutions of simultaneous linear equations: Cramer's rule; Gauss Elimination and Gauss Jordan Elimination; Vector spaces Definition of vector spaces and subspaces; Linear combination, Linear dependence and Independence, Basis and dimension Row and Column spaces; Eigenvalues and Eigenvectors, Properties of eigenvalues and eigenvectors, orthogonality of eigenvectors, geometric and algebraic multiplicity of eigenvalues; Application of diagonalisation of matrices, quadratic and bilinear forms, Jordan, Normal form of a matrix , Quadratic forms; Orthogonal matrices and theorems; Method of Gramm-Schimdt, Unitary matrices.

PST1233 Probability Theory and Statistics 12 Credits

This course focuses on descriptive statistics, probability, Axioms, mutually and independent events, Probability tree diagrams, Law of total probability, Conditional probability, Baye's Rule; Discrete random variables, probability density functions: mean, expectation, variance and their properties; Cumulative probability density functions; Special discrete distributions: Bernoulli and Binomial Uniform, hypergeometric , Geometric, Poisson, Use of Binomial and Poisson tables; Continuous random variables, probability density functions: mean, expectation,

variance and their properties; Cumulative probability density functions; Special Continuous Distributions: Uniform, Normal, Exponential; Normal approximation to binomial and to Poisson etc. Use of Z- tables; Moment and probability generating functions; Properties of moment generating functions, Joint Probability Distributions and marginal distribution; Markov and Chebshev's inequalities.

PST1331 Calculus 12 Credits

The course looks at continuous functions: Intuitive ideas of Limit of a function. Special limits: trigonometric. Theorems on limits, and properties of convergent sequences. Continuous functions; definition, conditions for continuity, Geometric representations. Differentiation: definition in terms of limits (from first principles), relationship with continuity, differentiation rules, Rolle's Theorem and Mean Value Theorems. Curve sketching and Taylor's Theorem, Integration: definition, fundamental theorems of integral calculus, properties of the definite integral, integration techniques, and evaluation of improper integrals. Reduction formulae, derivation and application. It further explores functions of several variables(domain and range) and their derivatives, Limits and continuity of functions with several variables, Partial derivatives, higher order partial derivatives, chain rule, directional derivatives, Double Integration: Changing of coordinate systems, Jacobians, Triple Integrals and Applications, Triple Integrals using spherical or cylindrical coordinates; Application of triple integrals to find area and Volume, sequence and series, power series, convergence tests, Taylor's Theorem ,centre of masses and moments of Inertia maximum and minimum points and Lagrange's multipliers. The application of MATHEMATICA , MATLAB, and Geogebra software is of prime importance in this course.

PST1232 Discrete Mathematics 12 Credits

This course looks at the real number system; Natural numbers, integers, rational, real numbers, decimal representations, irrationals, interval notation , inequalities and their solutions , absolute value; Set Theory: Introducing sets, set description, basic description and language, Operation on sets, Venn diagrams Theorems of Inclusion and operation on sets; De Morgan's Laws, Indexed sets and power sets, Ordered pairs and Cartesian Products, set theorems and proofs; Relations: properties symmetric, antisymmetric, transitivity, Types of relations; partial order and equivalence relation; Logic and propositions: predicates , truth values, logical equivalence and quantifiers; Mathematical proofs: proof by mathematical induction, direct proof, proof by transposition/contrapositive, proof by contradiction; Mathematical structures and operations : binary operations and properties, groups and rings.

PST1234 Ordinary and Partial Differential Equations 12 Credits

This course covers first order ODE solutions and their applications; Second Order equations: Linear independence, Wronskian; Solution of homogenous and non-homogenous ODE using method of undetermined coefficients, Variation of parameters and Laplace transforms; Predator-prey and Volterra-Litka equations; Series solution of ordinary differential equations; Frobenius method, Legendre polynomials and Bessel functions. The course further looks at solution of first order partial differentiation equations by integration and method of characteristics; Classification of second order partial differential equations with two independent variables; Derivation of the wave, heat, Laplace and Poisson equations; Solving second order Partial differentiation : change of variables, method of characteristics , separation of variables and Laplace transforms techniques; Fourier analysis: Fourier series and Fourier transforms, Fourier sine and cosine series; Half range Fourier series, convergence theorem;

Integration and differentiation of Fourier series; Application of Fourier series to boundary value problems; Fourier transforms and inverse; Convolution theorem and its applications.

PST1333 Linear Programming 12 Credits

This course highlights linear programming, model formulation, graphical LP solution, Solution of Maximisation and minimisation models, degeneracy, feasible solution, optimality condition, Linear Programming applications to real-life situations, simplex, Simplex Tableau computations, Big M method; Computer solution with Excel solver and AMPL; Duality; sensitivity analysis, sensitivity analysis with TORA, Excel solver and AMPL; Transportation Models: transportation algorithm(North-west corner, Least cost method, Vogel's Approximation Method), Balanced and unbalanced problems, Assignment models(Hungarian); Computer solution with TORA and AMPL, Network models : minimum spanning algorithm, shortest route algorithm, linear programming application and maximal flow models.

PST1332 Numerical Methods 12 Credits

The course looks at the types and causes of errors : Error sources , strategies for reducing errors; Introduction to simple numerical methods for solving problems in Mathematics Science and Finance, Simpson and Trapezium rule;; Numerical methods for root-finding simple iterative method, the Newton –Raphson method , Bisection method, convergence of Bisection method, Regula-Falsi or False Position method, Secant Method, Polynomial interpolation and splines; Solution of linear algebraic equations: direct and indirect methods; Numerical integration: Newton Cote's formulae, derivation of the trapezoidal and Simpson's rules, Romberg integration, Gaussian quadrature formulae; Numerical integration of ODE's, Euler and Taylor second order; Runge-Kutta methods. The application of MATLAB and MINITAB software is of prime importance in this course.

PST2030 Vector Calculus 12 Credits

This course gives a review of vector algebra: Vectors in the plane, Scalar/dot product, Cross/Vector product, Triple Scalar product and its applications, Vector Triple product; Vector Equations of Lines and Planes(parametric and Symmetric), Distance of appoint from a line, Distance of a point from a plane, Angles of intersection of lines and planes, Definition of vector–valued functions, Differentiation of vector functions: derivatives of vector functions, Limits and continuity of vector functions, partial differentiation of vector functions ,space curves, Curvature and torsion, Scalar fields - directional derivatives of a scalar field ,gradient of scalar fields, Laplacian of a scalar field, Vector fields : divergence and curl of vector fields, Laplacian operator: Conservative solenoidal and irrotational vector fields, line and surface integrals, Integral Theorems : Green's Theorem, Gauss' divergence Theorem, Stoke's Theorem, and their applications. Tensor analysis: Tensor Notation; The Summation Convention; The Permutation/Levi-Civita Symbol; Applications in solving vector Identities, Coordinate Systems: Curvilinear, Cylindrical, Polar Systems and Spherical Coordinate System.

PST2031 Analysis 12 Credits

The aspects covered in this course include real number system, countability of real number system, field axioms, order axioms; Completeness, Algebraic & Transcendental Numbers, supremum, infirmum, Axiom of Completeness; Archimedian principle, Limits of sequences; Cauchy sequence , bounded sequences , subsequences, Bolzano-Weitrass theorem; Cauchy-

Schwartz inequality, Pythagoras Theorem; Differentiability continuous functions, Uniform continuity, Intermediate value theorem; Integration : Riemann integrals, properties of Riemann Integrals, proofs on Riemann Integrals; Sequences and series of functions, uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation. Power series. Abel theorem. Elementary functions and their properties. Improper integrals, integrals depending on a parameter, improper integrals depending on a parameter, differentiation of integrals.

PST2034 Statistical Inference 12 Credits

This course focuses on basic concepts of Statistical Inference : deductive inference population, sample parameters and statistics; Measurement scales and types of data; Point estimation: methods of finding point estimators(Method of Moments, maximum likelihood and Least Squares); Properties of point estimators (biasedness, consistency, efficiency and sufficiency);Sampling distributions, Central Limit Theorem, Chi-Square student-t-test and F-distribution of the minimum and maximum sample; Estimation: methods of estimation, properties of estimators and their sampling distributions; Interval estimation: samples, proportion and confidence intervals; Confidence interval between two means and between two proportions; Hypothesis testing using confidence intervals(Z-test and t-test); Parametric test : t-test and Z–test; Hypothesis testing for a single mean and proportion, Hypothesis testing between two means and proportion: Matched t-test and correlated t-test; Non-parametric tests: Chi-square tests; goodness of fit and test of independence, Mann-Whitney, Wilcoxon, Runs, Kruskal Wallis test, Median test and sign test. The application of SPSS, MINITAB, STATISTICA and other Statistical packages is of prime importance in this course.

PST2233 Mechanics 12 Credits

The course looks at particle kinematics: displacement , velocity and acceleration of a vector, radius of curvature normal and tangential acceleration, coordinate system(Cartesian and polar system) , Particle dynamics : Newton's Laws of motion, Projectile motion: particle launched at horizontal & inclined plane, Circular motion(vertical and Horizontal), Work, Energy and Power momentum and collisions (direct impact) : Oscillations : Linear simple harmonic motion; Central forces and Orbits : Central Forces and Planetary Motion: Equations of motion for a particle in a central field, Potential energy of a particle in a central field, Conservation of energy and Kepler's law of planetary motion.

PST2334 Algebra 12 Credits

This course introduces students to that language through a study of groups, group actions, mappings, vector spaces, linear algebra, and the theory of fields. In abstract algebra, which is a broad division of mathematics, abstract algebra is the study of algebraic structures. Algebraic structures include groups, rings, fields, modules and algebras. It also involve associated homomorphisms of groups, rings and fields.

PST2503 Advanced Pedagogics in Mathematics 12 Credits

The topics covered in this course include : Theories in the learning of Mathematics: Constructivist learning theory, Realistic Mathematics Education Approach, Problem solving, The Japanese Lesson Study, Activity-based Facilitation, flipped classroom and Project Method; Philosophical issues in Mathematics: Forms of philosophies in Mathematics Education and their influence in Mathematics instruction; Forms of knowledge in mathematics: Conceptual Vs Procedural knowledge, Technological and Pedagogical Content Knowledge

(TPACK) Model; Assessment in Mathematics Education, Contemporary issues in Mathematics: Gender differential, Mathematics anxiety, Culture and Mathematics (Ethnomathematics), ICT integration in Mathematics Education including use of Geogebra software, scientific calculator and graphing calculators.

PST2233 Linear Models **12 Credits**

This course covers regression: Simple linear regression model; Residual analysis; Scatter plots and correlation(product moment and Spearman Brown correlation coefficients, Coefficient of determination , Least squares method; Full rank linear regression model, Multiple regression Model; General linear hypothesis; Stepwise methods; ANOVA(one and two way); Design Matrix, Quality of prediction and Hat matrix; Matrix representation covariance matrix; Design and Analysis of Experiments, completely randomized design, randomized complete block design, Latin squares, factorial experiments; Time Series : Trend analysis. The application of SPSS, MATLAB and MINITAB software is of prime importance in this course.

PHYSICS SPECIALIST COURSES

PST1130 Linear Mathematics **12 Credits**

The course looks at the complex numbers: geometric representation and algebra of complex numbers; De Moivres theorem polynomials and roots of polynomial equations, Roots roots of complex numbers; Matrices: Algebra of matrices, trace, rank of a matrix, determinants, inverses, row operations, solutions of simultaneous linear equations: Cramer's rule; Gauss Elimination and Gauss Jordan Elimination; Vector spaces Definition of vector spaces and subspaces; Linear combination, Linear dependence and Independence, Basis and dimension Row and Column spaces; Eigenvalues and Eigenvectors, Properties of eigenvalues and eigenvectors, orthogonality of eigenvectors, geometric and algebraic multiplicity of eigenvalues; Application of diagonalisation of matrices, quadratic and bilinear forms, Jordan, Normal form of a matrix , Quadratic forms; Orthogonal matrices andtheorems; Method of Gramm-Schimdt, Unitary matrices.

PST1131 Calculus 1 **12 Credits**

This course explores the concepts of Limits and continuity of single variable functions, Differentiation : rules of differentiation, differentiation from first principles, Leibnitz's Rule, L'Hopital's Rule, Rolle's Theorem, Mean Value Theorem of differential calculus; Application of differentiation: Maxima and minima, Integration: indefinite and definite integrals, Integration techniques: substitution method, integration by parts, tabular integration, trigonometric substitutions and reduction formulae; Mean value Theorem of Integral calculus; Application of integration: arc length, area, volume, moments of inertia and Centroids.

PST1172 Electricity and Magnetism **12 Credits**

The aims of the course are to develop abilities and skills that are relevant to the study and practise of electricity and magnetism and in everyday life. The course content includes Charge and current, Coulomb's law, electric fields, electrostatic potential, Gauss' law for electrostatics, capacitance, steady currents, magnetic effects of steady currents, forces acting currents in a magnetic field, electromagnetic induction.

PST1270 Thermal Physics and wave motion **12 Credits**

The course aims to develop an understanding of thermodynamic concepts and their applications to physical systems, introduce the kinetic theory of gases and aspects of wave motion. Course content includes, but not limited to; the zeroth and first laws of thermodynamics, application of thermodynamic laws to physical systems, application of the kinetic theory of matter especially to gases, mathematically describe wave motion in bounded and infinite media in one dimension, apply boundary conditions to wave equations and to determe the formation and analysis of standing waves in strings and pipes.

PST1272 Mechanics and Oscillations **12 Credits**

The aims of the course are to provide learners with a worthwhile base to the study of mechanics and oscillations, develop abilities and skills that are relevant to everyday life situations and promote inventiveness and enquiry within the context of social, economic, technological, ethical and cultural influences. The course content includes units and Dimensions, Particle kinematics, Vectors, Particle dynamics, Particle systems, Rigid body dynamics, Gravity, Oscillations.

PST1273 Atomic and Laser Physics **12Credits**

This course exposes learners to Atomic physics and Basic laser technology. Course content includes; atomic structure, structure of the hydrogen atom, radiative emission by atoms, nuclear models, atomic models, angular momentum, spectral fine structure, Zeeman effect, Stark effect, Stimulated emission, Einstein's A and B coefficients, population inversion, laser modes, examples of laser systems.

PST1370 Statistical Physics **12 Credits**

Basic concepts of Statistical Mechanics: Distribution functions and occupation numbers, Maxwell- Boltzmann, Fermi-Dirac and Bose-Einstein statistics, Derivation of ideal gas law using statistical mechanics methods, Quantum degenerate gases. Thermodynamics and statistical mechanics: Formulation and Justification.

PST2170 Quantum Physics 1 **12 Credits**

The course imparts to learners a set of mathematical tools needed to formulate problems in quantum mechanics, introducing methods of theoretical physics required to solve them. Topics covered include; the basics of spectroscopy, quantum paradoxes, Dirac notation, commutation relations, expectation values, and solving the Schrödinger equation for various situations.

PST2173 Electronics 1 **12 Credits**

Through this course, the learners are exposed to the study of D.C Circuits, Circuit Analysis Theorems, Active and passive circuit components, A.C Circuits, Phasors, Semiconductor Theory, Fundamental Devices, Transistors, Digital electronic devices- logic gate construction and operation, Truth tables Operational Amplifiers and circuits.

PST 2174 Optics and Modern Physics 12Credits

This course focuses on the nature and propagation of light, geometric optics, interference, polarization, photons, electrons and atomic structure, wave-particle duality, and nuclear physics.

PST2274 Physics Laboratory Practice and Techniques 12 Credits

This course emphasizes on: Good laboratory practice and safety; Basic laboratory techniques used in Physics inquiry; the scientific method to communicate findings, calculation and analysis of errors in practical work, error bars. It covers the major experiments in electricity and magnetism, thermal physics, electronics, atomic and nuclear physics, waves and optics.

PST2270 Nuclear Physics 12 Credits

This course equips learners with nuclear theories and the interaction of radiation with matter. An understanding of the nature of atomic nuclei and nuclear models is developed, as well as the applications of nuclear science in industry and modern technology.The course is meant to develop in learners an understanding of the nature of nuclei by examining the basic quantum mechanical model for the electronic structure of atoms and analysing nuclear reactions like fission, fusion and radioactivity.

PST2370 Electromagnetism 12 Credits

The Course looks at Capacitors, electric fields and energy, inductors, magnetic fields and energy, generators and eddy currents; Electromagnetic radiation, Maxwell's equations and electromagnetic induction, Faraday's law, Lenz law, motional e.m.f.

PST2603 Advanced Pedagogics in Physics Education 12 Credits

This Course focuses upon Trends: Real classroom experiences on pedagogies, Teaching and learning contexts, Classroom activities, Language of subject and instructions, Teaching materials, Enhancing classroom practice effectiveness; Pedagogics: Classroom techniques, Instructional procedures and languages, Teacher/Learner interactions; Challenges, ideas, suggestions, demonstrations, and examples of teaching science; Updated context and culturally sensitive classroom practices- trends in science teaching; Physics Curriculum.

NAME OF PROGRAMME: POST GRADUATE DIPLOMA IN SCIENCE AND TECHNOLOGY EDUCATION

Duration	1 ½ years
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKS Credit Load	216
ZNQF Level	9

Entry Requirements

Normal Entry: A Bachelor's degree majoring in either Mathematics, Science, Commercial or technology subjects or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

- apply innovative solutions to promote innovation and industrialisation of the country

- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies

- apply entrepreneurial and financial management skills in educational and personal Projects

- engage in professional and academic interactions guided by the philosophy of *unhu/*
- *ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

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Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST5101-Theoretical Foundations in STEM Education 1	18
PST5103-Instructional design in STEM education	18
PST5104-Curriculum Development and Evaluation	18
PST5105-Assessment and Evaluation in STEM Education	18
PST5119-Didactics and Pedagogy 1	18
Semester Two	

PST5201Theoretical Foundations in STEM Education II	18
PST5205 Designing Assessment and Grading tools	18
PST5208 Leadership, Supervision & Management in S&T education	18
PST5209 Research Methods and Statistics	18
PST5212 Computer Applications in STEM education	18
PST5213 Educational and Instructional	18
Level Two	
Semester One	
PST5300 Work based experience	36
PST5310-Research Project	36
PST5312 Online learning principles and practice	18
MAX MBKs CREDITS (80%)	**216**
ADDITIONAL CREDIT LOAD (20%)	90
TOTAL CREDIT LOAD 100% (80% +20%)	**306**

COURSE SYNOPSES

PST 5101 Theoretical Foundations in Stem Education I 18 Credits

The course explores the philosophical considerations, national goals, ideology and paradigms of educational practice; ethics, epistemology; educational policy, science and technology curriculum theory; modernism and postmodernism; positivism, determinism; Sociological considerations; society and socialization; family, culture and community influence, public schooling and social development and multi-cultural education.

PST 5102 The Teaching Profession 18 Credits

This course looks at the norms and values of the teaching profession, standards and benchmarks of professionalism; teacher profiles; teacher-student interaction; staff relations; external relations; the school as an organization, introductory organizational behaviour, staff development, promotion; recruitment, probation, remuneration, termination of service; Quality issues and standards in science and technology education, quality control, quality management, quality assurance in teaching and assessing students.

PST 5103 Instructional Design in Stem Education 18 Credits

The Course examines the methods and strategies of lesson delivery; Learner involvement and participation; group work, discussion, practical subjects, and project work; Curriculum, syllabus, schemes of work; taxonomy of educational objectives; setting objectives, lesson

planning and preparation, learning documentation, delivery and evaluation of lessons and the types of lessons.

PST 5104 Curriculum Development and Evaluation 18 Credits

The course covers curriculum terminology and concepts; ideology and philosophy underpinning curriculum planning, development and evaluation; Curriculum needs assessment models; The impact of social, economic, political, technological, psychological, philosophical and cultural, environmental influences on the curriculum; Process and product models of curriculum development; objectives models e.g; Tyler, Wheeler; decision-making models e.g; Stufflebeam (CIPP); Designing/developing, delivering and evaluating a curriculum; Curriculum change and innovation; strategies for change (Havelock's RD&D, SI, PS, L); Evaluating the overall effectiveness of curricula; curriculum evaluation models; course design and production, varying modes of delivering the curriculum, including flexible, distance, open and resource-based learning, and independent study. Examples of curriculum projects in Zimbabwe and internationally and concept maps and hierarchies, concept analysis as well as the roles of CRADU, CDU, RCZ, SIRDC will be explored.

PST 5105 Assessment and Evaluation in Stem Education 18 Credits

The Course highlights the principles of assessment in science and technology studies; Learner performance measurement, standards, methods of assessment; formative and summative assessment; types, functions and structures of tests and examinations; Types of test questions; objective and subjective; assessment and the taxonomies of educational objectives; standardized tests; assessment for science and technical subjects.

PST 5119 Didactics and Pedagogy I 18 Credits

The Course looks at the variety of science and technology lessons (Mathematics, biology, chemistry, physics, accounting, technical subjects, etc;); preparation of teaching documents and resources; designing and conducting experiments and practical lessons; supervision and assessment of projects; handling equipment and tools; peer teaching; peer and tutor evaluation of mock lessons; review of recorded lessons; using evaluation instruments; teacher reflection; case studies and journal/log book writing.

PST 5201 Theoretical Foundations in Stem Education II 18 Credits

The Course focuses on understanding the learner; physical, social, mental and emotional development; Psychological perspectives, learning and cognition, the non-western science and technology learner; education ideologies, humanism, behaviourism, Gestalt theory, cognitivism and constructivism, neural learning, multiple intelligences; Guidance and counselling, inclusive education and discipline.

PST 5205 Designing Assessment and Grading Tools 18 Credits

This Course is on item writing, structuring of examination questions and papers; Marking guides, scoring and recording; grading; criterion and norm-referenced testing; local and standardized tests; Continuous and terminal assessment, assessment of practical work, projects and field wok. Students are expected to set at least three original examination papers with marking guides in their teaching subjects.

PST 5208 Leadership, Supervision and Management in S & T Education 18 Credits

The Course looks at the administration of education; administrative tasks; school-based management; results-based management; power, authority, leadership and institutional

governance; leadership styles; school effectiveness; change and improvement; quality control; delegation, decentralization, empowerment and models of supervision; X-Ref PST2208.

PST 5209 Research Methods and Statistics 18 Credits
Teacher as researcher and reflective practitioner; qualitative and quantitative research methods; research and designs; ethical issues and problems in educational, scientific and technology research; data collection methods; populations and samples; proposal and report writing. Statistics in education and research; sampling theory, methods of summarising and interpreting data; frequency distributions; measures of central tendency; measures of dispersion, significance and hypothesis testing.

PST 5212 Computer Applications in Stem Education 18 Credits
The Course covers concepts of human communication; planning and using educational technology; learning environments; computers and learning; computer literacy; word processing, spreadsheets, document production, e-learning and online education.

PST 5213 Educational and Instructional Technology 18 Credits
The Course looks at using appropriate technology for teaching and training; The chalk board; The white board; The overhead projector; The slide projector; The video recorder; Use of video and television in the classroom; Basic use of computers for producing training materials; Presentation techniques using multimedia packages and e-learning fundamentals (X-Ref PST1213).

PST 5300 Work Based Experience 36 Credits
This is supervised and assessed professional practice in schools and a review of professional documentation, resources and learning environments; observation of lessons; discussion and counselling. The Course counts as two taught Courses.

PST 5310 Research Project 36 Credits
A short experimental, theoretical or design project preferably linking the specialist subject of the candidate to teaching and learning. The project counts as two taught Courses.

PST 5312 Online Learning Principles and Practice 18 Credits
The Course is on theory and practice of online learning. Students engage in a virtual learning experience to gain skills in online lesson planning, delivery and assessment of students. The Course counts as two taught Courses.

MASTER'S PROGRAMMES (MScED) 1 ½ YEARS

1. Master of Science Education in Accounting and Business Studies
2. Master of Science Education in Biology
3. Master of Science Education in Chemistry
4. Master of Science Education in Computer Science
5. Master of Science Education in Mathematics
6. Master of Science Education in Physics

NAME OF PROGRAMME MASTER OF ECIENCE EDUCATION IN ACCOUNTING AND BUSINESS STUDIES

Duration	1½
Minimum Credit Load	270
Maximum Credit Load	330
M aximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd degree will be able to demonstrate the following competencies through the field of Accounting and Business Studies:

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects

- engage in professional and academic interactions guided by the philosophy of *unhu/ ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST6101 Philosophical issues in STEM education	18
PST6103-Trends in Accounting and Business Studies Education	18
PST6162-Advanced financial Reporting	18
PST6161-Applied Management Accounting	18
PST 6162 Strategic Management	18
Semester Two	
PST6208 Quality Assurance	18
PST6211-Advanced Research Methods and Statistics	18
PST6260-Advanced Financial Management	18
PST6263-Curriculum and Pedagogical issues in Accounting and Business Studies Education	18
PST6361-Advanced Taxation	18
Level Two	
Semester One	
PST6310-Dissertation	90
PST6205 Assessment in Stem Education	18
PSTT6361 Corporate Governance	18
PST6362 Advanced Taxation	18

MAX MBKS CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80%+ 20%)	**288**

NAME OF PROGRAMME MASTER OF SCIENCE EDUCATION IN BIOLOGY

Duration	1 ½ years
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Special Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in

Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent qualifications from accredited and recognized institutions.

Special Entry: N/A Mature Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd degree will be able to demonstrate the following competencies through the field of Biology:

apply innovative solutions to promote innovation and industrialisation of the country

- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies

- apply entrepreneurial and financial management skills in educational and personal projects
- engage in professional and academic interactions guided by the philosophy of *unhu/ Ubuntu.*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination

weighted at 60%. Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST6103-Trends in Biology Education	18
PST 6136 Biotechnology Applications	18
PST 6137 Advanced Genetics	18
PST6139 Zoology	18
Semester Two	
PST6211-Advanced Research Methods and Statistics	18
PST6235-Advanced Biological Science Techniques	18
Environmental Microbiology	18
PST6235-Curriculum and Pedagogical Issues in Biology Education	18
	18

Level Two	

PST6310 Dissertation	90
PST 6205 Assessment in Stem Education	18
PST6337 Botany	18
PST 6338 Advanced Biological Science Techniques	18
MINIMUM MBKS (80%)	**234**
ADDTITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80%+20%)	**288**

NAME OF PROGRAMME MASTERS OF SCIENCE EDUCATION IN CHEMISTRY

Duration 1 ½ years

Minimum Credit Load 270

Maximum Credit Load 330

Maximum MBKs Credits 234

ZNQF Level 9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education Degree, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd degree will be able to demonstrate
the following competencies through the field of Chemistry:

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal projects
- engage in professional and academic interactions guided by the philosophy of *unhu/ ubuntu*
- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination

weighted at 60%. Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST6101 Philosophical issues in STEM education	18

PST6303 Trends in Chemistry Education	18
PST6142- Organic Chemistry 5	18
PST6143-Environmental Chemistry	18
PST6144- Analytical Chemistry 5	18
Semester Two	
PST6208-Quality Assurance	18
PST6211-Advanced Research Methods and Statistics	18
PST6241 Inorganic Chemistry 5	18
PST6243-Curriculum and Pedagogical Issues in Chemistry	18
Level Two	
PST6310-Dissertation	90
PST 6205 Assessment in Stem Education	18
PST6336 Advanced Biochemistry	18
PST6342 Physical Chemistry 5	18
MINIMUM MBKS (80%)	**234**
ADDTITIONAL CREDITS(20%)	**54**
TOTAL CREDIT LOAD 100% (80% +20%)	**288**

NAME OF PROGRAMME MASTER OF SCIENCE EDUCATION IN COMPUTER SCIENCE

Duration	1½
Minimum Credit Load	270
Maximum Credit Load	330
M aximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in

Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd degree will be able to demonstrate the following competencies through the field of Computer Science:

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects
- engage in professional and academic interactions guided by the philosophy of *unhu/*
- *ubuntu*
- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at

60%.

Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST6101 Philosophical issues in STEM education	18
PST6304 Trends in Computer Science Education	18
PST6175 Computational Discrete Mathematics	18
PST6178 Information Systems Security and Auditing	18
PST6179 Advanced Enterprise Architecture Programming	18
Semester Two	
PST6211 Advanced Research Methods and Statistics	18
PST6208 Quality Assurance	18
PST6276 Advanced Database and Data Mining	18
PST6278 Curriculum and Pedagogical Issues in Computer Science Education	18
Level Two	
Semester One	
PST6210-Dissertation	90
PST6205 Assessment in Stem Education	18
PST6378 Evolutionary Computing and Parallel Distributing Processing	18
PST6375 Simulation and Modelling	18
MAXIMUM MBKS CREDITS (80%)	**234**
ADDTITIONAL CREDITS(20%)	**54**
TOTAL **CREDIT LOAD (80% +20%)**	**288**

NAME OF PROGRAMME MASTER OF SCIENCE EDUCATION IN MATHEMATICS

Duration	1½
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd degree will be able to demonstrate the following competencies through the field of Mathematics:

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects
- engage in professional and academic interactions guided by the philosophy of *unhu/*
- *ubuntu*
- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessments

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST6101 Philosophical issues in STEM education	18
PST6132- Advanced Numerical Methods	18
PST6133-Non Linear Ordinary Differential Equations (ODEs)	18
PST6134-Multivariate Statistics	18
PST6503-Trends in Mathematics Education	18
Semester Two	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18
PST6232 Metric Spaces and Topology	18
PST6233 Numerical Methods for Partial Differential Equations (PDEs)	18
Level Two	
Semester One	
PST6310-Dissertation	90
PST620 Assessment in Stem Education	18
PST6333 Numerical Methods for Partial Differential Equations	18
PST6332-Functional Analysis	18
MAX MBKS CREDITS(80%)	**234**
ADDTITIONAL CREDITS(20%)	**54**
TOTAL CREDIT LOAD 100% (80%+20%)	**288**

NAME OF PROGRAMME MASTER OF SCIENCE EDUCATION IN PHYSICS

Duration	1½
Minimum Credit Load	270
Maximum Credit Load	330
M aximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BSc Education, Bachelor of Education, or BSc with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature

Entry: N/A Other (indicate): N/A

LEARNING OUTCOMES

Holders of the MScEd/MEd degree will be able to demonstrate
the following competencies through the field of Physics:

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects
- engage in professional and academic interactions guided by the philosophy of *unhu/*
- *ubuntu*
- design, implement, monitor and evaluate innovative curricula and policies to

promote innovation and industrialization

- manage educational programmes and institutions.

Assessments

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module Name	**Credits**
Level One	
Semester One	
PST 6101: Philosophical issues in STEM Education	18
PST6603 Trends in Physics Education	18
PST6170 Mathematical Methods in Physics	18
PST6173 Electricity and Magnetism 5	18
PST6174 Atomic and Optical Physics	18
Semester Two	
PST6208-Quality Assurance	18
PST6211-Advanced Research Methods and Statistics	18
PST6270- Quantum Mechanics 5	18
PST6273-Curriculum and Pedagogical issues in Physics Education	18
Level Two	
Semester One	
PST6310 Dissertation	90
PST6205 Assessment in Stem Education	18
PST6271Mechanics 5	18
PST6374 Thermodynamics 5	18

MAX MBKS CREDITS (80%)	**234**
MBKs CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% +20%)	**288**

COURSE SYNOPSIS

PST6101 Philosophical Issues in Stem Education 18 Credits

The course explores the nature of scientific/mathematical knowledge; science sub-culture; knowledge bases and knowledge management; indigenous knowledge and science; views and conceptions of STEM education; alternative views; paradigms and ideologies; positivist, post-positivist, modernist, postmodernist, functionalist, inductivist and feminist perspectives.

PST6205 Assessment in Stem Education 18 Credits

This course covers testing, measurement and evaluation; categorising assessment; judging the quality of assessment tools and processes; measures of validity and reliability as well as examination systems and processes.

PST6208 Quality Assurance 18 Credits

The course highlights inputs, processes and products of science, mathematics and technology education; measures of quality in teaching, assessment and educational management; resource planning and mobilisation; accreditation, standards control; research and case studies in quality science and mathematics education.

PST6211 Advanced Research Methods and Statistics 18 Credits

The course covers introduction to research and its rationale, Types of Research, Research paradigms, Approaches and designs; Sampling techniques, Internal and External Validity, Data collection instruments and their designs, Data analysis techniques, Organization and presentation, research proposal. The course further looks at descriptive statistics: Frequencies, Frequency tables, Measures of central tendency, measures of dispersion/ variability, measures of relative standing, measures of location, Inferential statistics; Correlation Analysis: Pearson Product moment, Spearman Rank order; Hypothesis testing: Parametric and Non-parametric tests, Chi – square, t – test, ANOVA, ANCOVA: Regression Analysis : simple and multiple regression. The course provides students with knowledge, skills and capacity to use current computer packages such as SPSS, Atlas.ti and Nvivo to analyse both quantitative and qualitative data pertaining to research in Education.

PST6310 Dissertation 90 Credits

This course affords students the opportunity to practice and develop practical skills in conducting advanced research and compiling a research report in a dissertation format. It should be acknowledged that research formats vary, but the course attempts to ensure that it exposes students to at least four types of research formats. Other areas to be dealt with include; research plan, preliminary pages and their contents, appendices, tables and figures, referencing

systems, typing and presenting. A report of minimum 10 000 words developed in a stipulated period thorough a supervised process. The dissertation is undertaken over 2 semesters and counts as 5 Courses.

ACCOUNTING AND BUSINESS STUDIES SPECIALIST COURSES

PST6103 Trends in Accounting and Business Studies 18 Credits

Introduction to trends in Accounting and Business Studies research. Contemporary research themes in Accounting and Business Studies. The impact of research on teachers' Accounting and Business Studies knowledge domains. Effects of research in chemistry education on Accounting and Business Studies content and pedagogy. How to analyse research reports.

PST6160 Advanced financial Reporting 18 Credits

The aim is to gain a comprehensive understanding of the advanced financial accounting concepts, and practices associated with International Financial Reporting Standards. A greater understanding of, accounting for Conceptual Framework, Employee Benefits, Share Based Payments and financial instruments is acquired through the study of this Course as students develop integral knowledge of financial statements. Upon completion of this Course students should be able to better assess the tools, definitions and acceptable practices of International Financial Reporting Standards.

PST6261 Strategic Management 18 Credits

The student will be able to ascertain, measure, and revise strategic goals associated with performance and develop a performance metrics system that will measure performance against the overall organisational strategic goals. In addition, ethical and moral dimensions of strategic financial decision-making will be explored. The student will be able to ascertain, measure, and revise strategic goals associated with performance and develop a performance metrics system that will measure performance against the overall organisational strategic goals. In addition, ethical and moral dimensions of strategic financial decision-making will be explored.

PST6161 Applied Management Accounting 18 Credits

The aim is to explore the use of management accounting and accounting systems to link strategic leadership, resource management, and organisational performance. This Course develops the ability to manage resources, create and sustain value, and develop a system of organisational score and goal-keeping tools. The ability to integrate these skills with accounting systems will enable the organisation to make performance-based decisions.

PST6262 Advanced Financial Management 18 Credits

The aim of this Course is to examine and integrate into practice a blend of global financial management strategies and case-based applications. Through intense case study analysis, this Course focuses on topics that range from the acquisition, deployment and management of international financial resources, to financial planning and analysis. The student will learn how

to devise strategies for identifying and developing international financial resources, and to effectively communicate these strategies with organisational team members, partners and governments. The student will also become adept at analysing an organisation for reorganisation and restructuring from a strategic perspective

PST6263 Curriculum and Pedagogical Issues in Accounting & Business Studies 18 Credits

The course is designed to enable students to explain and analyse recent pedagogical developments in Accounting & Business Studies Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of the Accounting & Business Studies curriculum.

PST6361 Corporate Governance 18 Credits

The aim is to analyse the regulation of governance, recognise varying international governance practise, and examine the links between governance and corporate performance. This Course will enable the student to gain a practical understanding of how governance structures can promote good decision making and performance, and increase the accountability of directors and managers. Key external regulations can affect organisations such as international tax and law, are highlighted extensively. The capacity to assess and monitor director remuneration will also be an acquired asset by the time Course is complete.

PST6362 Advanced Taxation 18 Credits

The aim is to gain a comprehensive understanding of the regulations, concepts, and practices associated with local taxation. A greater understanding of taxation is acquired through the study of this Course as you develop integral knowledge of the global taxation practices. Upon completion of this Course students should be able to better assess the regulations, definitions, and acceptable practises of local and international taxation based on the different tax laws as required in many countries and economic trade areas.

BIOLOGY SPECIALIST COURSES

PST 6203 Trends in Biology Education 18 Credits

Introduction to trends in Biology research. Contemporary research themes in biology. The impact of research on teachers' biology knowledge domains. Effects of research in biology education on biology content and pedagogy. How to analyse research reports.

PST6139 Zoology 18 Credits

This course is aimed at imparting knowledge to students on the animal kingdom, animal behaviour, classification and their interaction with the environment. Furthermore, the course will offer to students knowledges about metabolic pathways and their linkage. In addition students will be exposed to Metabolites – monosaccharides, lipids, amino acids and nucleotides. Nature of enzymes – kinetics, reaction mechanism of chymotrypsin and lysozyme,

purification and physico – chemical characterization, regulation of enzyme activity. Furthermore, students will have knowledge on metabolic basis of nutrition, metabolic basis of specialized tissue function, metabolic disorders, metabolic basis of diagnostics, metabolism and adaption with one example, regulation of metabolism at molecular, cellular and organismic levels, enzymes and receptors as drug targets.

PST6137 Advanced Genetics 18 Credits

This course offers fundamental research insights with its applications and integrates genetics, gene technology, cell biology, molecular biology, biotechnology and bioinformatics. All these disciplines have a common basis in molecular genetics, which is the discipline that explains how the information in the genes is expressed and how it can give rise to various traits of an organism. Emphasis is also placed on subjects including genetic mechanisms underlying disease, mapping, and diagnostic methods. Thus, the course will assist students to be problem solvers, not only in school contexts but also in industry.

PST 6235 Curriculum and Pedagogical issues in Biology 18 Credits

The course is designed to enable students to explain and analyse recent pedagogical developments in Biology Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of the Biology curriculum.

PST6237 Environmental Microbiology 18 Credits

This course will introduce students to the field of environmental microbiology, which is the study of microbes in natural environments such as soil, water and air. Investigation will focus on microbial distribution, diversity, physiology, biochemistry, function and ecology along with commonly employed microbiology methods. It also covers biotechnology and bioremediation, which are topical issues in environmental microbiology. The course further looks at bacterial and viral structure; composition and physiology of microbial communities in the soil, in water and the air; microbial interactions and processes; advances in virology and bacteriology; mechanisms of microbial parthenogenesis; immune system disorders; HIV/AIDS and cancer.

PST6337 Botany 18 Credits

This course provides students with specialised advanced education and training with specializations within a range of molecular genetics to climate change impacts on marine and terrestrial ecosystems. The degree demands a high level of intellectual and theoretical knowledge and insight into problems related to the field of study and of critical reasoning, formulation, analysis and evaluation of a specific Botany related problem as a field of study.

PST6338 Advanced Biological Science Techniques 18 Credits

This course aims to provide high-level research training in the biological sciences to equip students with advanced research skills and with transferable skills, which will be of value to those aspiring to complete a PhD, as well as to all research-oriented scientists. Furthermore, the course an advanced level of understanding and critical awareness of major issues and challenges in the biological sciences in the national and global contexts. The course aims to

develop life-long learners with the capacity to engage in collaborative and independent research contexts based on biological issues.

CHEMISTRY SPECIALIST COURSES

PST6303 Trends in Chemistry Education 18 Credits

In this course, students explore Trends in chemistry research; Contemporary research themes in chemistry; Impact of research on teachers' chemistry knowledge domains; Effects of research in chemistry education, chemistry content and pedagogy; Analysing research reports.

PST6143 Environmental Chemistry 18 Credits

The course addresses today's global challenges caused by increasing industrialisation and over-exploitation of natural resources: Contamination of air, soil, water and whole ecosystems, political dimension; Future sustainable resource management; Current impact prediction, and Clean-up of past contaminated sites; Environmental compartments: air, soil, and water, chemical modelling, inorganic and organic chemistry, microbiology, toxicology, ecosystem analysis, and human environment interactions; Analytics, and toxicology, experimental biogeochemistry and isotope geochemistry; integrative and methodological Courses; Global environmental chemical challenges; Front-end analytical techniques.

PST6144 Analytical Chemistry 5 18 Credits

This course examines and provides strong links to world leading research in the field of mass spectrometric analysis of biological samples; Methods of analytical chemistry; Advanced research instruments; Analytical neurochemistry and imaging mass spectrometry: Projects in a dynamic and world-class research environment; Advanced analytical chemistry: Advanced mass spectrometry.

PST6141 Organic Chemistry 5 18 Credits

The course looks at Organic chemistry in general but with specific reference to education: structure, properties composition, reactions and proportional by synthesis or by other means of carbon- based compounds, hydrocarbons, and their derivatives; Compounds with any member of the other elements, including hydrogen, nitrogen, oxygen, the halogens as well as phosphorous, silicon and sulphur. Organic Chemistry in professional activities including specialized and advanced tasks.

PST6241 Inorganic Chemistry 5 18 Credits

In this course, students look at descriptive inorganic and physical inorganic chemistry: Bioinorganic chemistry; Inorganic polymers; Research methods; Reaction kinetics and Synthetic chemistry; Theory of Spectroscopy as applied to ultra violet-visible, infrared and rotational spectroscopy; Auger electron spectroscopy; Inorganic NMR, Electronic Spectroscopy; X-ray absorption, X-ray crystallography; Atomic absorption spectroscopy

(AAS); Mass spectroscopy and electrochemistry; Electron spin resonance and inductive coupled plasma-mass spectrophotometer.

PST6243 Curriculum and Pedagogical Issues in Chemistry Education 18 Credits

The course explores and analyses recent pedagogical developments in Chemistry Education at all levels of the education system covering aspects such as curriculum design; implementation; and evaluation of Chemistry Education curriculum in secondary schools.

PST6336 Advanced Biochemistry 18 Credits

The Course focuses on cell biology, molecular biology; molecular structure & function; components of biological systems; experimental and computer-based techniques of biochemistry
and molecular biology; structural and chemical biology: nucleic acid structure and interactions, signalling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design; from genome to proteome: eukaryotic gene expression; the dynamic cell: dynamics of proteins and membrane-bound organelles in eukaryotic cells; cell cycle, signalling and cancer: cell and molecular biology of signalling and cancer, DNA repair and apoptosis.

PST6342 Physical Chemistry 5 18 Credits

This Course explore physical chemistry and modern experimental techniques; Quantum mechanics and spectroscopy: Quantum mechanical principles, Electronic structure for atoms and molecules; Rotational, Vibrational, and Electronic spectroscopy; Femtosecond laser spectroscopy; Chemical systems: Reaction dynamics, and electron transfer reactions applied to solar cells, artificial photosynthesis and photo-catalysis; Development of new solutions for sustainable production of energy and fuels: kinetics and mechanisms of electron transfer reactions in solar cells, photo-catalysis, and artificial photosynthesis; Modern physical chemistry Techniques and Research; Theoretical aspects and simulation methods related to materials.

COMPUTER SCIENCE COURSES

PST6304 Trends in Computer Science Education 18 Credits

Introduction to trends in Computer Science Education research. Contemporary research themes in Computer Science Education. The impact of research on teachers' Computer Science Education knowledge domains. Effects of research in chemistry education on Accounting and Business Studies content and pedagogy. How to analyse research reports.

PST6175 Computational Discrete Mathematics 18 Credits

This Course looks at discrete models; Foundations; Basic concepts of sets and functions; Finite series; Logic; Propositional logic; Predicate logic; Combination circuits; Induction; Finite probability space, events; Conditional probability; Bayes' theorem; Integer random variables; Expectations; Varia Analysis and verification; Searching algorithms; Recursive algorithms;

Relations; Discrete models; Foundations; Basic concepts of sets and functions; Finite series; Logic; Propositional logic; Predicate logic; Combination circuits; Induction; Finite probability space, events; Conditional probability; Bayes' theorem; Integer random variables; Expectations; Varia Analysis and verification; Searching algorithms; Recursive algorithms; Relations; Basic concepts; Properties of relations; Operations relations; Undirected graph, Directed graph, weighted graph, Euler circuits and Hamiltonian cycles; Graph isomorphism and representation Planar graphs; Trees; Different state machines; Input, Output, Initial state and the transition

PST6178 Information Systems Security and Auditing 18 Credits

The Course looks at developing an Information Security Policy, Physical Computer Security, Biometrics and Digital Signatures, Network Intrusion Detection and Prevention System, Wireless and Mobile Network Security, E-commerce Security, Risk Management & Analysis, Biba Integrity Model, Nature of IS Audit, Audit responsibilities against fraud, IS audit guidelines and standards.

PST6179 Advanced Enterprise Architecture Programming 18 Credits

This Course gives an introduction to application server programming and business logic programming; Transaction processing, concurrency control, Event-driven programming, asynchronous method invocation, job scheduling, Inter process communication; Deployment of software components in application server; Business Interface development and deployment.

PST6276 Advanced Database and Data Mining 18 Credits

The Course examines the data Models; The enhanced Entry Relationship (EER) Model, EER Models to Relational Databases, Database Design and Implementation design methodologies, Implementation methodologies, Physical Database design and tuning, Query process and Optimization; Algorithm for Query Processing and Optimization, Transaction Processing, Concurrency Control Techniques; Database Security and Distribution, Distributed Databases, Mobile Databases Machine Learning and Pattern Recognition as well as Data Mining

PST6243 Curriculum and Pedagogical Issues in Computer Science Education 18 Credits

The course is designed to enable students to explain and analyse recent pedagogical developments in Computer Science Education at all levels of the education system. It will also cover aspects such as curriculum design, implementation and evaluation of the Computer Science Education curriculum.

PST6375 Simulation and Modelling 18 Credits

This Course covers the advances in simulation and modelling methodology; Modelling complexities and decision making simulation using system dynamics; Applied statistical functions, Experimentation, Applied statistical methods for analysis and modelling; Approaches to structuring simulations; Contrasting discrete, continuous and agent-based simulation

PST6378 Evolutionary Computing and Parallel Distributing Processing 18 Credits

This Course looks at the fundamentals of genetic algorithms, genetic programming; Conceptual simplicity and broad applicability of genetic algorithms; Features of evolutionary computation, evolutionary strategies, evolutionary programming; Hybridization and Optimization techniques; Heuristic level: knowledge representation, inference strategies; Man-machine interfaces; Fuzzy set theory; Decision: Classical, nonstandard and fuzzy logic; Data representation; Network configurations: single layer non-recurrent networks; Multilayer non-recurrent networks; Recurrent networks; Application for artificial neural networks: character and speech recognition, image analysis Parallel distributed processing; General framework; Distributed representation; Basic mechanisms and formal analysis.

MATHEMATICS AND STATISTICS SPECIALIST COURSES

PST6503 Trends in Mathematics Education 18 Credits

The course gives an introduction to trends in mathematics education and research. It covers contemporary research themes in mathematics education such as constructivist teaching, problem-solving, project-based learning, etc. The impact of research on teachers' mathematics knowledge domains. Effects of research in mathematics education on mathematics content and pedagogy. It will look at how to analyse research reports and articles.

PST6132 Advanced Numerical Methods 18 Credits

The topics covered in this course include: mathematical and computational foundations of the numerical approximation and solution of scientific problems; simple optimisation; vectorisation; clustering; polynomial and spline interpolation; pattern recognition; integration and differentiation; solution of large scale systems of linear and nonlinear equations; modelling and solution with sparse equations; explicit schemes to solve ordinary differential equations; random numbers; stochastic system simulation. The application of Numerical packages such as MATLAB, MINITAB and in solving problems is of prime importance.

PST6133 Non-Linear Ordinary Differential Equations 18 Credits

The course provides students with an understanding of the basic concepts involved in formulating differential equation models and interpreting them. It enables students to relate and apply differential equations to many other areas such as engineering, dynamical systems, fluid dynamics, finance and biology. It also presents the basic ideas of the theory of nonlinear differential equations and illustrate them with a wealth of examples and applications**.** It will provide students with various techniques for solving mathematical problems involving autonomous and non-autonomous systems, phase portraits, Hermitian and non-Hermitian systems, non-linear systems and bifurcations and transitions to chaos. The use of MATLAB and Mathematica to solve problems involving differential equations is expected in this course.

PST6134 Multivariate Statistics 18 Credits

This course is on the multivariate statistical methods; Multivariate techniques; Graphic models, Pre-analysis data, Pre-analysis data screening, Factorial analysis of variance, Analysis of covariance, Multivariate analysis of variance and covariance, Multiple regression, Path analysis, Factor analysis, Discriminant analysis, Logistic regression, SPSS data sets and Chi-square distribution.

PST6230 Curriculum and Pedagogical Issues in Mathematics 18 Credits

The course is designed to enable students to explain and analyse recent pedagogical developments in Mathematics Education at all levels of the education system. It will also cover aspects such as curricular theory, curriculum design, implementation, evaluation and analysis of the current Mathematics curriculum in Zimbabwe. The course further explores the pedagogical issues in the teaching of mathematics in secondary schools as well as pedagogics in mathematics.

PST6232 Metric Space and Topology 18 Credits

This course looks metric spaces: definitions and examples; Inequalities of Holder, Minkowski, Cauchy-Schwarz; Open and closed sets, neighbourhoods; Convergence, completeness; Contraction Mapping Theorem, continuity and open sets for metric spaces; Closed sets for metric spaces; Closed sets for metric spaces; Topological spaces: Interior and closer; Topological structures and spaces; Hausdorff spaces; Compactness; Compactness in metric spaces; Products of compact spaces and the language of neighbourhoods**.**

PST6332 Functional Analysis 18 Credits

This course starts by looking at a review of metric spaces. The topics covered include: Normed spaces: definitions and examples; Banach space; Inner Product spaces: definitions and examples; Hilbert spaces, Cauchy-Schwarz inequality, Pythagoras' theorem; Parallelogram law, Polarisation Identity, Orthogonal complements and direct sums; Orthonormal sets, Finite dimensional space; compactness and Riesz Lemma; Linear operators and functionals; Dual space; Second dual; Reflexivity; Weak convergence Fourier series and orthogonal polynomials; Hilbert adjoint operator; Self-adjoint operators; Eigenvalues and eigen functions and Operators.

PST6333 Numerical Methods for Partial Differential Equations 18 Credits

This course explores finite difference methods for solving standard linear partial differential equations (PDEs). PDEs are used to model a great variety of physical phenomenon, from fluid flow to wave propagation in acoustics, electromagnetics, and elastodynamics. It focuses on practical implementation, analysis of stability, accuracy, convergence of these numerical methods. It looks at fast iterative solvers in solving linear systems arising from discretizations of such PDEs. Advanced topics may include nonlinear PDEs as well as standard finite element methods for general domains. Through projects, students will gain programming experience in implementing the studied algorithms using MATLAB/Octave.

PHYSICS SPECIALIST COURSES

PST6103 Trends in Physics Education **18 Credits**

This Course introduces learners to modern trends in mathematics related research methods ,contemporary themes in Physics, the impact of research on educators' Physics knowledge base, effects of research in mathematics education on Physics content and pedagogy, how to analyse research reports.

PST6174 Atomic and Optical Physics **18 Credits**

This course aims to equip learners with knowledge and competencies on atomic, molecular, and optical physics (AMO physics) aiming to interpret fundamental laws of physics to learners. The course will ensure that learners understand the structure of matter and how matter evolves at the atomic and molecular levels. The course ensures learners develop insights of the nature of light in all its manifestations, which will enable them to develop new techniques and devices. Furthermore, the course will provide both theoretical and experimental methods based on essential data to other areas of science (e.g. chemistry, astrophysics, condensed-matter physics, plasma physics, surface science, biology and chemistry.

PST6170 Mathematical Methods in Physics **18 Credits**

The Course has a complex Analysis: Multi-valued functions; Evaluation of Integrals; Singularities of functions; Fourier series and Fourier analysis; Orthogonality, random process probability; Convolution and De-convolution; Differential Equations: Higher order differential equations with constant and non-constant coefficients; Partial differential equations; Special Functions: Sturm-Lioville Theory; Legendre, Laguerre; Hermite and Bessel functions; Group Theory: Definition and examples of groups, The action of a group on a set; Small oscillations and group theory; Compact and Lie groups; Applications of groups in quantum mechanics and spectroscopy.

PST6171 Electricity and Magnetism 5 **18 Credits**

This Course addresses electrical and thermal conduction, Hall's effect , Arnold Somerfield combined classical Drude model and quantum mechanics in the free electron model, Fermi gas model of electrons, conductors, semiconductors, insulators, Charge and current, Coulomb's law, electric fields, electrostatic potential, Gauss' law for electrostatics, capacitance, steady currents, magnetic effects of steady currents, forces acting currents in a magnetic field, electromagnetic induction, Maxwell's equations, electromagnetic waves.

PST6270 Quantum Mechanics 5 **18 Credits**

This course covers Schrodinger's theory of Quantum Mechanics, the wave particle duality-wave function and its properties, probabilities, solution of the time-independent Schrodinger equation for different types of potentials including the harmonic oscillator, operators and operator algebra, commutation relations, observables and expectation values, spherical harmonics, perturbation theory, angular momentum, spin-orbit interactions, Pauli principle.

PST6273 Curriculum and Pedagogical Issues in Physics Education **18 Credits**

The Course explores and analyses recent pedagogical developments in Physics Education at all levels of the education system covering aspects such as curriculum design; implementation; and evaluation of Physics Education curriculum in secondary schools.

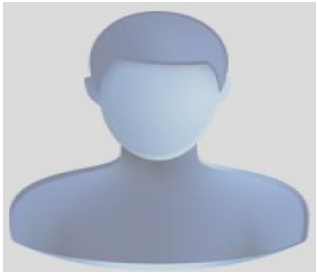
PST6370 Mechanics 5 **18 Credits**

The Course covers fundamental forces using the Newtonian, Hamiltonian, De Alembert's theorem and Lagrangian classical mechanics formulations and modern quantum theory, inertia forces in different frames, generalised coordinates, constraints of motion(Holonomic and non Holonomic), derivation and application of Hamilton's equations of motion, derivation and application of Lagrange's equations of motion to different systems, solution of single and double penduli, inclined planes, the Artwood machine, gravitation, centralised forces.

PST6374 Thermodynamics 5 **18 Credits**

The course content includes; systems, state variables, thermal equilibrium, the zeroth law of thermodynamics and temperature, thermodynamic equilibrium, equation of state for ideal gases, thermodynamic processes, macroscopic and microscopic approaches to systems, reversible and irreversible processes.

DEPARTMENT STAFF



Chairperson Mr Louis Sibanda

Qualifications

1. PhD-Education (in progress) (University of Free State)
2. Masters of Science Education in Chemistry (MScED) – Bindura University of Science Education 2017- Zimbabwe
3. Bachelor of Education Honours in Applied Chemistry – National University of Science and Technology 2014 – Zimbabwe.
4. Diploma in Education(Secondary) – Gweru Teachers' College (1999)- Zimbabwe

Skills and competencies: Teaching; Supervision, Monitoring and Evaluation of undergraduate and postgraduate students research projects; Module Writing Setting, Administration, Invigilation and Marking of undergraduate and postgraduate examinations; Research.

Research Interests: Improving Chemistry Education. Education for sustainable Development, STEM Education, Comprehensive Sexuality Education, Computational Chemistry.

5. **Email** : louis.sibanda@nust.ac.zw

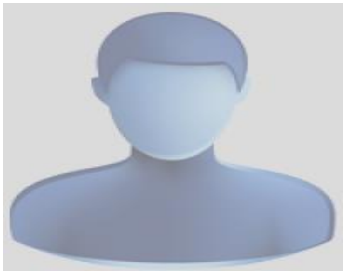
Secretary

Mrs Slindeni Nguwaya

National Diploma in Secretarial Studies

Bulawayo Polytechnic

Profile Picture



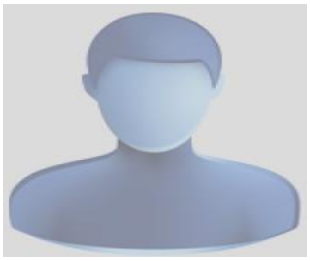
Lecturer: Mrs Nomathemba Moyo

1. **Qualifications:** MSc-Ed – Physics, Bindura University of Science Education; Bed-Physics, National University of Science and Technology; Dip-Ed, Hillside Teachers' College.

2. **Skills and competencies:** Relationship Building; Student Motivation; Program Evaluation; Creating Positive Learning Environment; Practical based approach with innovative methodologies, Friendly personality and excellent communication skills, counselling
3. **Research Interests:** issues in Physics Education, Education for sustainable Development, STEM Education, Comprehensive Sexuality Education, Robotics and Computational Physics.
4. **Research and Publications- Nil**

5. **Email**: nomathemba.i.moyo@nust.ac.zw

Profile Picture



Lecturer: Mr Mehluli Moyo

Qualifications

1. Msc.Ed Accounting and Business Studies (NUST-2022)
2. BSc.Ed Accounting and Business Studies (NUST -2018)
3. Diploma in Education (University of Zimbabwe -2014)

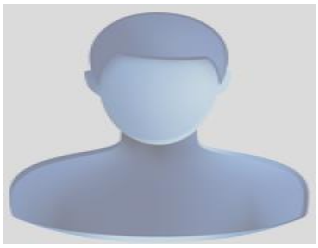
Competencies and Skills: Module compilation, Lecturing, Students' Assessment, and Research

Research Interests: Working capital management in public high schools

RESEARCH & PUBLICATIONS

Examining factors affecting effective working capital management in public high schools in Zimbabwe: A case study of a high school in Umguza District of Matabeleland North Province (2022).

Profile Picture



Lecturer: Ms Irene Mpofu

Qualifications

1. Msc Ed in Chemistry (University of Zimbabwe-1994)
2. BSc.Ed Chemistry (University of Zimbabwe-1988).

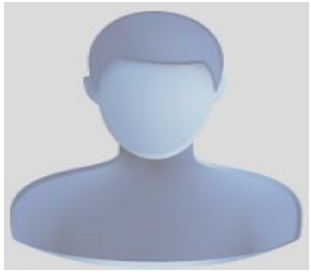
Competencies and Skills: Teaching, computer skills and Research.

Research Interests: Science Education.

RESEARCH & PUBLICATIONS

1. E Makarudze, B Mugwisi, I Mpofu.2007. 'O' Level Integrated Science Revision Guide. Longman Zimbabwe. Harare. 247 pages.
2. Phuthi, N. Mpofu, I. (2021) Critical Reflection In Science Teaching and Learning: Crossing Borders into Western Science. American Journal of Education Research.

Profile Picture



Lecturer: Ms Duduzile Moyo

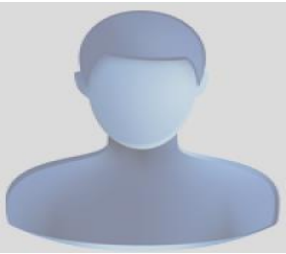
Qualifications

- Master of Science Education Degree in Computer Science (National University of Science and Technology,2018)
- Bachelor of Education Honours Degree in Computer Science (National University of Science and Technology, 2013)
- Diploma in Education (University of Zimbabwe)

Conference Presentations

1. **Moyo, D.** and Mangena. A 2021. An analysis of Self Directed Learning using Online Leaning in Higher Education during Covid 19. National University of Science and Technology. Faculty of Science and Technology Education. 1st Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe. (*Oral*)
2. Mangena A, **Moyo D** and Sibanda L, 2022 Ant Colony Optimization (ACO) Algorithm use in Student Programme Selection in Higher Education: perspectives of A case of one selected university in Zimbabwe. Mutare Polytechic College Zimbabwe. (*Oral*).
   Email: duduzile.moyo@nust.ac.zw

Profile Picture



Lecturer: Mr Joseph Hlongwane

Qualifications

- Msc.Ed. Physics (Bindura University of Science Education-2017)
- BSc.Ed (Hons) Physics (NUST-2013)

Competencies and Skills: Teaching and tutoring; Student assessment; Curriculum designing; Technology integration; Communication; Lecturing.

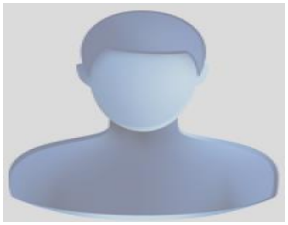
Research Interests: Physics Education, Technology Integration in Science Education

RESEARCH & PUBLICATIONS

Hlongwane, J (2023). The Paradox of Leadership and Gender, Women in Higher Education Management: The Zimbabwean Perspective. P.201-218 Vol Vii

Email: joseph.hlongwane@nust.ac.zw

Profile Picture



Lecturer: Ms Sesilani Nkomo

Qualifications

- Master of Science Education Degree in Mathematics (Bindura University of Science Education, 2016)
- Bachelor of Education Honours Degree in Mathematics (National University of Science and Technology, 2013)
- Diploma in Education (University of Zimbabwe, 2003)

RESEARCH PUBLICATIONS

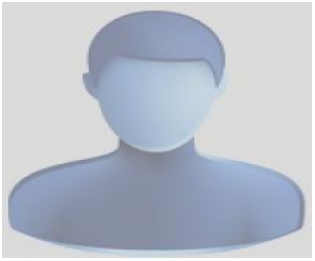
- Chikusvura, N., **Nkomo, S.** and Sibanda, L. (2022). Transition to Virtual Graduation: Experiences of 2021 University Graduates in Zimbabwe. Vol.3 No.3. 497-503. https://www.randwickreserach.com/index.php/rielsj/article/view/537.

Conference Presentations

- **Nkomo, S**. and Moyo, K. 2022. The effects of Covid-19 pandemic on education at a selected university in Zimbabwe. National University of Science and Technology. Faculty of Science and Technology Education. 2nd Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe. (*Oral*)
- Moyo, K. and **Nkomo, S**. 2022. An analysis of the incorporation of technology in Tertiary Institutions of Zimbabwe National University of Science and Technology. Faculty of Science and Technology Education. 2nd Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe.(*Oral*).

Email: sesilani.nkomo@nust.ac.zw

Profile Picture



Lecturer: Mr Andrew Mandla Mangena

Qualifications

- Master of Science Education in Computer Science (NUST 2018)
- PGDSTE Postgraduate Diploma in Science and Technology Education (NUST 2016)
- BSc (Hons) in Computing (UNISA, 2014)
- Bachelor in Business Administration (BBA) Computer and Management of Information Systems (C&MIS) (Solusi University, 2012)

Competencies and Skills: ICT integration, Supervision, Research

Research Interests: E-Learning, Self-Directed Learning, Computer Science Education

RESEARCH & PUBLICATIONS

1) Mangena A. (2023) *Assessment of Factors Contributing to a Digital Divide in Mainstreaming E-learning in Higher Education —A Selected Case of a University in Bulawayo Province, Zimbabwe* A, Mangena Academic Star, Modern Review for Education
2) Manokore, K., Sibanda, L., Shava, G., Mangena, A., Muzari, T., Sibanda, Z., & Mkwelie**,** N. (2023). *Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe*. British Journal of Multidisciplinary and Advanced Studies, 4(5), 1-20.

3) Manokore, K, Tlou, F., Mkwelie, N., Phuthi, N., Shava, G.N., Mhlanga, E., Mangena, A., Sibanda, Z. Chasokela, D. (2022), *Quality Higher Education for Sustainable Development: The Transition towards Achieving Agenda 2030 Global Goals*, International Journal of Latest Research in Humanities and Social Science (IJLRHSS) Volume 05 - Issue 02, 2022 www.ijlrhss.com PP. 09-21

4) Shava, G., Manokore, K., Mhlanga,. E., Mpofu, M., Phuthi, N., Mkwelie, N., Mangena, A.(2021) *Mainstreaming Education For Sustainable Development, The Transition Towards Achieving Sustainable Development Goal 4 On Quality In Higher Education*, Volume 02, Issue 06" November - December 2021"ISSN 2583-0333

Research Conferences Attended and Presented

1) Mangena, A.(2023) E Schools Community Engagement: A case of Hwange District, Mat North Province, Bulawayo at the 1st ADERA (African Development and Education Research Association) Conference 20-23 June 2023, Ezulwini, Kingdom Of Eswatini, Swaziland

2) Ncube, N., Ncube, C. & Mangena, A. (2023) Design and Implementation of a Web-based School Learning management system for School Administrators and Teaching and Learning National University of Science and Technology. Faculty of Science and Technology Education. 3rd Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe. 18-20 October 2023, Bulawayo, Zimbabwe
3) Mkwananzi, D & Mangena, A. (2023) Simulation and Modelling in Computer Science Education: Experiences from teacher educators, National University of Science and Technology. Faculty of Science and Technology Education. 3rd Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe. 18-20 October 2023, Bulawayo, Zimbabwe

4) Manduna, W & Mangena, A. (2022) An analysis of factors contributing to low usage of Computer Aided Design (CAD) in Teaching Building Technology Design at Ordinary Level Secondary Education. A case of Goromonzi District Mashonaland East Province at the 2nd Research Conference, Bulawayo Polytechnic College in Victoria Falls
5) Mangena, A. (2024) Open Distance and e-learning (ODeL): The impetus for shaping the future of Higher Education in the context of Zimbabwe. Sanord 14th International Conference, Polokwane , Ranch Resort , Pretea Hotel 5-7 December 2022

6) Mangena, A. & Sibanda, L. (2021). Lecturers' predicaments in using online platforms during COVID19 lockdown: A case of a university in Zimbabwe. Paper presented at the 8th Annual Research Day at National University of Science and Technology in Bulawayo, 2 September, 2021.
7) Mangena, A. & Sibanda, L. (2021). Encounters and challenges of using Information and Communication Technology for higher education academic staff during COVID 19 lockdown: A Case Study of a selected University in Zimbabwe. Paper presented at the 1ST Virtual Conference on Education for Sustainable Development at National University of Science and Technology in Bulawayo, 11-13 August, 2021.

8) Moyo, D. & Mangena. A (2021). An analysis of Self Directed Learning using Online Leaning in Higher Education during Covid 19. National University of Science and Technology. Faculty of Science and Technology Education. 1st Education for Sustainable Development Interdisciplinary Research Conference. Bulawayo, Zimbabwe.
9) Mangena, A., Moyo, D. & Sibanda, L. (2022) Ant Colony Optimization (ACO) Algorithm use in Student Programme Selection in Higher Education: perspectives of A case of one selected university in Zimbabwe. Mutare Polytechic College Zimbabwe.

10) Mangena, A., (2021) An Assessment of Factors Contributing to a Digital Divide in Mainstreaming eLearning in Higher Education, a selected case of a University in Bulawayo Province, Zimbabwe on 5-8 July 2021, Association of African Universities (AAU) 15th General Conference, Accra, Ghana

11) Phuthi, N., Sibanda, L., Mabhena, M. & Mangena, A. (2021) Institutional manoeuvres towards adoption and sustainable implementation of online distance teaching and learning on 11-13 August 2021 at National University and Technology (NUST) Education for Sustainable Development First Virtual Conference, Bulawayo Zimbabwe

Profile Picture

Lecturer: Mr Nhlanhla Mkwelie

Qualifications

- MscEd in Mathematics (BUSE: 2011-2013)

- B.Ed in Mathematics (Midlands State University: 2006-2007)
- Diploma in Education (University of Zimbabwe- 2000-2002)

Competencies and Skills: Teaching, Research Supervision, Teaching Practice assessment

Research Interests: Indigenous Knowledge System, Education for Sustainable Development, Teacher Professional Development, ICT integration

RESEARCH & PUBLICATIONS

1. Mangwende, E., & Mkwelie, N. (2023). An assessment of student support services within the Open Distance e-Learning Programme in Zimbabwe: International Journal of Research and Innovation in Social Sciences. 7(9), 1320-1335, DOI: https://dx.doi.org/10.47772/IJRISS.2023.70973
2. Manokore, K., Sibanda, L., Shava, G., Mangena, A., Muzari, T., Sibanda, Z., & **Mkwelie, N. (2023)**. *Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe*. British Journal of Multidisciplinary and Advanced Studies, 4(5), 1-20.
3. Satamwe, N., & **Mkwelie , N. (2023)**. *Online learning opportunities for Quality Rural Learning Ecologies.* In Ndlovu, C. (2023), Quality Education in Rural Learning Ecologies Education in Zimbabwe: Obstacles and Opportunities., New York, Peter Lang.
4. **Mkwelie, N**., & Satamwe, N. (2022). *Integration of Indigenous Mathematical Knowledge into the Mathematics Education for Sustainable Learning*. In Ndlovu, C., & Shizha, E. (2022), Dynamics of Indigenous Knowledge systems, New York, Peter Lang.
5. George N Shava, **Mkwelie, N**., Ndlovu, M.J., Zulu, E. (2023). *Higher Education Institutions' Sustainable Development towards Agenda 2030: A Global Goals in Policy and Curriculum*. International Journal of Research and Innovation in Social Sciences, 7(4), 1320-1335. DOI: https://doi.org/10.47772/IJRISS.2023.7510
6. Leonard, R., Chingozha P, Shava, G. N., **Mkwelie, N.,** Gwebu N, Manokore K., & Muzari T. (2022): *Moving from the Edge to the Centre; the Role of Zimbabwe Higher Education in Achieving Education for Sustainable Development: Addressing the Quality Imperative*. International Journal of Research in Academic World, 1(15): 78-84.
7. Manokore, K., Tlou, F.N., **Mkwelie, N**., Phuthi,N., Shava, G.N., Mhlanga,E., Mangena, N., Sibanda, Z., and Chasokela, D.(2022). *Quality Higher Education for Sustainable*

Development: The Transition towards Achieving Agenda 2030 Global Goals. International Journal of Latest Research in Humanities and Social, 5(2), 9-21.

8. Shava, G. N., Manokore, K., Mhlanga, E. Mpofu, M., Phuthi, N., **Mkwelie, N.,** A. Mangena, A.(2021). *Mainstreaming Education for Sustainable Development, the transition towards achieving sustainable development goal 4 on quality in Higher Education.* International Journal of Research in Education Humanities and Commerce,2(6), 69-88.

JOURNAL ARTICLES REVIEW

9. Reviewer of article No.25 for the first issue of Mosenodi Journal of the Botswana Educational Research Association (2017).

Reviewer of Article 7876 International Journa1l for Educational Development in Africa(IJEDA): Preference of Mathematics textbook illustrations among Primary School pupils in Ibadan: implications for Counselling Psychology (2022).

Profile picture:

1. Full name and job title: **Lecturer Mr Ipelegeng Matibela**

2. **Qualifications:** MScEd in Chemistry Education (National University of Science & Technology); Bachelor of Education (Honours) in Chemistry (National University of Science & Technology).

3. **Skills and competencies:** Inorganic chemistry, Organic chemistry, Analytical chemistry, Physical chemistry, Environmental chemistry, Industrial chemistry, Computer skills: Game Development, SPSS in quantitative research analysis, CAD/ CAM.

4. **Research Interests:** Science, Technology, Engineering and Mathematics (STEM) education curricula, Optimisation and use of ICTs in Chemistry education, Game development for Chemistry Education, Innovations and inventions in Chemistry and Technology.

5. **Conference presentations:**

- **Matibela Ipelegeng** & Mpofu Irene (2022) Optimisation if ICTs in Teaching and Learning of Chemistry in Rural Secondary Schools, NUST-FSTE 2nd ESDIR Conference 2022.
- Mangena Andrew, **Matibela Ipelegeng**, Mkwelie Nhlanhla & Hlongwane Joseph (2022) Exploring the pedagogical teaching computer applications used by facilitators in Computer Science Education, Chemistry Education, Mathematics Education and Physics Education: Moving towards a more sustainable approach, NUST-FSTE 2nd ESDIR Conference 2022.

6. **Email**: ipelegeng.matibela@nust.ac.zw

Profile picture:

1. Full name and job title: **Lecturer Dr Mabhena Mpofu**

Qualifications: PhD Education Management (Fort Hare, 2011), MEd (EAPPS)), ZOU 2003, BEd (EAPPS), ZOU, 1998

Email: mabhena.mpofu@nust.ac.zw

Profile picture:

1. Full name and job title: **Lecturer Mr Lungisani Mpofu**

2. **Qualifications:** MSc (Fin & Invest), (NUST, 2012), BAcc Hons, (UNISA, 2012), BCom Hons, (NUST, 2009)

Email: lungisani.mpofu@nust.ac.zw

DEPARTMENT OF TECHNICAL AND ENGINEERING EDUCATION AND TRAINING.

BACKGROUND

To keep the wheels of industry turning, Zimbabwe needs a class of well-trained educators who will impart 21st-century skills to the millions of students in our Universities, Polytechnics, Vocational and Technical Colleges and Schools. The Department of Technical and Engineering Education and Training was thus established in 2014 to address manpower needs in our education institutions. In its infancy, the department had a staff complement of 3, comprising 2 lecturers and a secretary. Over the years, the department has grown to become the cornerstone of technical engineering education in the university. It now has a staff complement of 6.

The department's mandate is to train teachers, lecturers and trainers in technical and engineering fields for deployment in schools, colleges and universities. Our programmes include 5 Bachelor of Technology Education Honours Degrees and 5 Master of Technology Education Degrees in Civil and Construction Engineering, Electrical and Electronic Engineering, Mechanical and Industrial Engineering, Wood Science and Technology and Technical Graphics. The Department also offers a Post-graduate Diploma in Tertiary and Higher Education.

The Department subscribes to the Education 5.0 doctrine through world-class teaching, cutting-edge research, and community outreach, in an effort to innovate and industrialize the economy.

Vision

To be the lead Engineering, Technical and Vocational Education Department in Southern Africa.

Mission

The Department seeks to contribute to the manpower development needs of the country through the collaborative training of teachers, lecturers, and trainers in the technical and engineering fields.

Core Values

Integrity
Transparency
Teamwork
Excellence
Productivity

Why study with us?

Our department offers a number of benefits to local and international students who wish to pursue technical and engineering-related disciplines and educators.

- We provide a friendly and inclusive teaching and learning environment that caters for learners of diverse needs and cultures.
- We have a highly qualified team of lecturers who have vast experience in the education and engineering landscape.
- A publishing culture that is inculcated to both staff and learners.
- A web of local and international stakeholders that include industry, government, the community, sister universities and alumni.

Research

Through research, the department wishes to make a positive contribution to the engineering education literature and to produce intellectual outputs that would catapult the economy to industrialization. Our researchers publish articles in these areas:

- Sustainable higher education
- Technical and Vocational Education and Training
- Electrical and Electronic engineering education.
- Design and Technology Education
- E-learning

- Mechanical Engineering Education
- Engineering Graphics
- Civil Engineering Education
- Water Engineering Education

DEGREE PROGRAMMES

A. UNDERGRADUATE PROGRAMMES (BTechEd) 2-year programmes

1. Bachelor of Technology Education Honours Degree in Civil and Construction Engineering
2. Bachelor of Technology Education Honours Degree in Electrical and Electronics Engineering
3. Bachelor of Technology Education Honours Degree in Mechanical and Industrial Engineering
4. Bachelor of Technology Education Honours Degree in Wood Science and Technology
5. Bachelor of Technology Education Honours Degree in Technical Graphics

Name of Programme	**Bachelor of Technology Education (Hons) in Civil and Construction Engineering**
Duration	2 years
Minimum Credit Load	240
Maximum Credit Load	300
Maximum MBKs Credits	**192**
ZNQF Level	8

Entry Requirements

Special Entry: Diploma in Education from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Normal Entry: N/A

Mature Entry: N/A

Other: N/A

LEARNING

OUTCOMES

Holders of the BTechEd degree in Civil and Construction Engineering will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Civil and Construction Engineering curriculum
- Apply sound research and technological techniques when carrying out research in Civil and Construction Engineering.
- Monitor, assess and evaluate learners, learning processes, projects and programmes related to Civil and Construction Engineering.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PTE1131 Engineering Mathematics	12
PTE1145 Engineering Drawing	12
PTE1147 Material Science	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PTE1245 Industrial Design	12
PTE 1231 Engineering Mathematics II	12
PTE1246 Engineering Mechanics I	12
PTE1256 Workshop Technology and safety	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PTE2146 Fluid Mechanics	12
PTE2147 Strength of materials	12

PTE2157 Construction Survey (TCW2102)	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PTE2258 Analysis of Structures	12
PTE2259 Environmental Engineering	12
PTE2156 Transport Engineering and Planning	12
PTE2158 Hydraulic Design	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

Name of Programme **Bachelor of Technology Education Honours Degree in Electrical and Electronics Engineering**

Duration 2 years

Minimum Credit Load 240

Maximum Credit Load 300

Maximum MBKs Credits **192**

ZNQF Level 8

Special Entry: Diploma in Education from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Normal Entry: N/A
Mature Entry: N/A
Other (indicate): N/A

LEARNING OUTCOMES

Holders of the BTechEd degree in Electrical and Electronics Engineering will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Electrical and Electronics Engineering curriculum
- Apply sound research and technological techniques when carrying out research in Electrical and Electronics Engineering.
- Monitor, assess and evaluate learners, learning processes, projects and programmes related to Electrical and Electronics Engineering.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PTE1131 Engineering Mathematics 1	12
PTE1153 Circuit Theory and Networks	12
PTE2177 Programming & programme design	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PTE1252 Electrical and Electronic Measurements	12
PTE1253 Electronic Engineering Circuits and Devices	12
PTE1231 Engineering Mathematics II	12
PST1203 STEM Learning and Teaching Strategies	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PTE2150 Analogue Electronics	12
PTE2250 Analogue Communication	12
PTE2153 Instrumentation and control	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PTE2253 Design Project	12

PTE2254 Digital Electronics	12
PTE2151 Digital communication	12
PTE4276 Graphic Design	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

Name of Programme **Bachelor of Technology Education Honours Degree in Mechanical and Industrial Engineering**

Duration 2 years

Minimum Credit Load 240

Maximum Credit Load 300

Maximum MBKs Credits **192**

ZNQF Level 8

Entry Requirements

Special Entry: Diploma in Education from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Normal Entry: N/A

Mature Entry: N/A

Other (indicate): N/A

LEARNING OUTCOMES

Holders of the Bachelor of Technology Education Honours Degree (BTechEd) in Mechanical and Industrial Engineering will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Mechanical and Industrial Engineering curriculum
- Apply sound research and technological techniques when carrying out research in Mechanical and Industrial Engineering.
- Monitor, assess and evaluate learners, learning processes, projects and programmes related to Mechanical and Industrial Engineering.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	Credits
Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PTE1131 Engineering Mathematics	12
PTE1145 Engineering Drawing 1	12
PTE1147 Material Science	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PTE1256 Workshop Technology and safety	12
PTE1245 Industrial Design	12
PTE1231 Engineering Mathematics II	12
PTE1246 Engineering Mechanics I	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PTE2146 Fluid Mechanics	12
PTE2147 Strength of materials	12
PTE2153 Instrumentation and control	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PTE2245 Engineering Design	12
PTE2246 Thermodynamics	12
PTE2148 Maintenance Engineering	12
PTE2149 Manufacturing Systems	12

MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

Name of Programme **Bachelor of Technology Education Honours Degree (BTechEd) in Wood Science and Technology**

Duration 2 years

Minimum Credit Load 240

Maximum Credit Load 300

Maximum MBKs Credits **192**

ZNQF Level 8

Entry Requirements

Special Entry: Diploma in Education from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Normal Entry: N/A
Mature Entry: N/A
Other (indicate): N/A

LEARNING OUTCOMES

Holders of the Bachelor of Technology Education Honour Degree (BTechEd) in Wood Science and Technology will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Wood Science and Technology Curriculum
- Apply sound research and technological techniques when carrying out research in Wood Science and Technology.
- Monitor, assess and evaluate learners, learning processes, projects and programmes related to Wood Science and Technology.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	

PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PTE1145 Engineering Drawing 1	12
PTE1147 Material science	12
PTE1185 Wood chemistry	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PTE1256 Workshop Technology and safety	12
PTE1246 Engineering Mechanics 1	12
PTE1282 Technical drawing	12
PTE1288 Material and Construction	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing , Assessment and Evaluation	12
PTE2185 Wood structure, quality and processing	12
PTE2187 Construction equipment & methods	12
PTE2289 Wood finishes	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PTE2189 Wood manufacturing systems & processes	12
PTE2287 Wood machines & Maintenance Engineering	12
PTE4181 Building services	12
PTE2258 Analysis of structures	12
MAX MBKs CREDITS (80%)	**192**
ADDITIONAL CREDITS (20%)	**108**

TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

Name of Programme **Bachelor of Technology Education Honours Degree (BTechEd) in Technical Graphics**

Duration 2 years

Minimum Credit Load 240

Maximum Credit Load 300

Maximum MBKs Credits **192**

ZNQF Level 8

Entry Requirements

Special Entry: Diploma in Education from an accredited and recognized institution or equivalent in the specified subject, and five 'O' Level passes including English Language and Mathematics, or their equivalents.

Normal Entry: N/A
Mature Entry: N/A
Other (indicate): N/A

LEARNING OUTCOMES

Holders of the Bachelor of Technology Education Honours Degree (BTechEd) in Technical Graphics will be able to:

- Use innovative technology-enhanced teaching strategies to implement the Technical Graphics curriculum
- Apply sound research and technological techniques when carrying out research in Technical Graphics.
- Monitor, assess and evaluate learners, learning processes, projects and programmes related to Technical Graphics.
- Analyse and exploit entrepreneurial opportunities to promote innovation and industrialisation.
- Adapt to educational changes in their environments to promote innovation and industrialisation
- Apply soft skills such as Ubuntu and critical thinking in both their professional and personal interactions
- Manage both personal and institutional finances

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	Credits

Level One	
Semester 1	
PST1112 ICT Applications in Education	12
PST1118 Culture and Heritage Studies	12
PST1163 Entrepreneurship and Financial Management	12
PTE1181 Architectural Mathematics	12
PTE1145 Engineering Drawing 1	12
PTE1147 Material Science	12
Semester 2	
PST1211 Research Methods and Statistics	12
PST1204 Curriculum Development and Evaluation	12
PTE2181 Architectural & structural drawing	12
PTE1288 Material and Construction	12
PTE 1281 Applied structural statics and dynamics	12
PTE1282 Technical drawing	12
Level Two	
Semester 1	
PST1101 Theoretical foundations in STEM education	12
PST2105 Testing, Assessment and Evaluation	12
PTE2180 Applied Geometry	12
PTE 4184 Computer-Aided Architectural Design	12
PTE2183 Environmental design	12
Semester 2	
PST3000 Work-based Experience	12
PST2210 Research Project	24
PST2308 Educational Management	12
PTE2281 Building Construction	12
PTE4181 Building services	12
PTE2258 Analysis of Structures	12
PTE1258 Design of Structures	12

MAX MBKs CREDITS	**192**
ADDITIONAL CREDITS (20%)	**108**
TOTAL CREDIT LOAD 100% (80% + 20%)	**300**

B. MASTER'S PROGRAMMES (MTechED) 1 ½ YEARS

1. Master of Technology Education in Civil and Construction Engineering
2. Master of Technology Education in Electrical and Electronics Engineering
3. Master of Technology Education in Mechanical and Industrial Engineering
4. Master of Technology Education in Wood Science and Technology
5. Master of Technology Education in Technical Graphics

Name of Programme **Master of Technology Education in Civil and Construction Engineering**

Duration 1 ½ years

Minimum Credit Load 270

Maximum Credit Load 330

Maximum MBKs Credits 234

ZNQF Level 9

Entry Requirements

Normal Entry: BTech Education, Bachelor of Education, or BTech with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTHE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature Entry: N/A

Other (indicate): N/A

LEARNING OUTCOMES Holders of the MTechEd degree will be able to demonstrate the following competencies through the field of Civil and Construction Engineering

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects
- engage in professional and academic interactions guided by the philosophy of *unhu/Ubuntu*
- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST6101 Philosophical Issues in STEM Education	18
PTE6154 Electronic, Power sources and circuits	18
PTE6157 Surface Water Modelling	18
PTE6156 Environmental Engineering & water resources	18
PTE6159 Structural design in concrete & steel	18
Semester 2	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18
PST 6204 Curriculum and Pedagogical Issues in Education	18
PTE6456 Water, Resources Planning & Management	18
Level Two	
Semester 1	
PST6310 Dissertation	90
PST6205 Assessment in STEM Education	18
PTE6257 Ground Water Modelling	18
PTE6259 Environmental Engineering & Management	18
MAX MBKs CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% +20%)	**288**

Name of Programme **Master of Technology Education in Electrical and Electronics Engineering**

Duration	1 ½ years
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BTech Education, Bachelor of Education, or BTech with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTHE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature Entry: N/A

Other (indicate): N/A

LEARNING OUTCOMES Holders of the MTechEd degree will be able to demonstrate the following competencies through the field of Electrical and Electronics Engineering

- apply innovative solutions to promote innovation and industrialisation of the country

- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects

- engage in professional and academic interactions guided by the philosophy of *unhu/ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level one	

Semester 1	
PST6101 Philosophical Issues in STEM Education	18
PTE6153 Linear Systems	18
PST6175 Computational Discrete Mathematics	18
PTE6152 Automation and Robotics	18
PTE6145 Human Factor Engineering	18
Semester 2	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18
PST 6204 Curriculum and Pedagogical Issues in Education	18
PTE6208 Management and Technology	18
Level Two	
PST6310 Dissertation	90
PST6205 Assessment in STEM Education	18
PST6275 Simulation and Modelling	18
PTE6254 Intelligent Condition and Monitoring	18
MAX MBKs CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% +20%)	**288**

Name of Programme **Master of Technology Education in Mechanical and Industrial Engineering**

Duration 1 ½ years

Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BTech Education, Bachelor of Education, or BTech with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTHE or equivalent qualifications from accredited and recognized institutions.

Special Entry: N/A

Mature Entry: N/A

Other (indicate): N/A

LEARNING OUTCOMES Holders of the MTechEd/MEd degree will be able to demonstrate the following competencies through the field of Mechanical and Industrial Engineering

- apply innovative solutions to promote innovation and industrialisation of the country

- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies

- apply entrepreneurial and financial management skills in educational and personal Projects

- engage in professional and academic interactions guided by the philosophy of *unhu/ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	Credits
Level One	
Semester 1	
PST6101 Philosophical Issues in STEM Education	18
PTE6146 Environmentally conscious engineering	18
PST6175 Computational Discrete Mathematics	18
PTE6145 Human Factor Engineering	18
PTE6152 Automation and Robotics	18
Semester 2	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18
PST 6204 Curriculum and Pedagogical Issues in Education	18
PTE6248 Computer Control & Manufacturing Systems	18
Level Two	
PST6310 Dissertation	90
PST6205 Assessment in STEM Education	18
PST6275 Simulation and Modelling	18
PTE6246 Production Management	18
MAX MBKs CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% = 20%)	**288**

Name of Programme **Master of Technology Education in Technical Graphics**

Duration 1 ½ years

Minimum Credit Load 270

Maximum Credit Load	330
Maximum MBKs Credits	234
ZNQF Level	9

Entry Requirements

Normal Entry: BTech Education, Bachelor of Education, or BTech with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTHE or equivalent from accredited and recognized institutions.

Special Entry: N/A

Mature Entry: N/A

Other (indicate):N/A

LEARNING OUTCOMES Holders of the MTechEd/MEd degree will be able to demonstrate the following competencies through the field of Technical Graphics

- apply innovative solutions to promote innovation and industrialisation of the country
- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies
- apply entrepreneurial and financial management skills in educational and personal Projects
- engage in professional and academic interactions guided by the philosophy of *unhu/ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Total Notional Study Hour Credits**
Level One	
Semester 1	
PST 6101 Philosophical Issues in STEM Education	18
PTE6182 Advanced design and manufacturing	18
PTE6180 Architectural design and drawings	18
PTE6280 Advanced Engineering Science	18
PTE6258 Advanced Construction	18
Semester 2	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18

PST 6204 Curriculum and Pedagogical Issues in Education	18
PTE6275 Simulation and Modelling	18
Level Two	
PST6310 Dissertation	90
PST6205 Assessment in STEM Education	18
PTE6246 Production Management	18
PTE6281 Integrated Building Services	18
MAX MBKs CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% + 20%)	**288**

Name of Programme **Master of Technology Education in Wood Science and Technology**

Duration 1 ½ years

Minimum Credit Load 270

Maximum Credit Load 330

Maximum MBKs Credits 234

ZNQF Level 9

Entry Requirements

Normal Entry: BTech Education, Bachelor of Education, or BTech with Post Graduate Diploma in Education, Graduate Diploma in Education, Grad CE, PGDTHE or equivalent from accredited and recognized institutions.
Special Entry: N/A
Mature Entry: N/A
Other (indicate):N/A

LEARNING OUTCOMES Holders of the MTechEd/MEd degree will be able to demonstrate the following competencies through the field of Wood Science and Technology

- apply innovative solutions to promote innovation and industrialisation of the country

- apply advanced educational tools in research, policy development, analysis and evaluation
- employ innovative and technology-enhanced teaching strategies

- apply entrepreneurial and financial management skills in educational and personal Projects

- engage in professional and academic interactions guided by the philosophy of *unhu/ubuntu*

- design, implement, monitor and evaluate innovative curricula and policies to promote innovation and industrialization
- manage educational programmes and institutions.

Assessment

Coursework: Each taught course shall be assessed through continuous assessment in the form of assignments, tests, quizzes, short projects or oral and other presentations. These components must collectively constitute 40%.

By thesis: N/A

Written Examinations: Each taught course shall have a written examination weighted at 60%.

Other: N/A

Module name	**Credits**
Level One	
Semester 1	
PST 6101 Philosophical Issues in STEM Education	18
PTE6182 Advanced design and manufacturing	18
PTE6188 Advanced material science	18
PTE6147 Material Technology	18
PTE6258 Advanced Construction	18
Semester 2	
PST6208 Quality Assurance	18
PST6211 Advanced Research Methods and Statistics	18
PST 6204 Curriculum and Pedagogical Issues in Education	18
PTE6288 Timber Engineering	18
Level Two	
PST6310 Dissertation	90

PST6205 Assessment in STEM Education	18
PTE6246 Production Management	18
PTE6389 Advanced Wood Processing	18
MAX MBKs CREDITS (80%)	**234**
ADDITIONAL CREDITS (20%)	**54**
TOTAL CREDIT LOAD 100% (80% + 20%)	**288**

NAME OF PROGRAMME: POST GRADUATE DIPLOMA IN TERTIARY AND HIGHER EDUCATION

Duration	1 ½ years (18 Months)
Minimum Credit Load	270
Maximum Credit Load	330
Maximum MBKS Credit Load	216
ZNQF Level	9

Entry Requirements

Normal Entry: A Bachelor's degree/Postgraduate degree or equivalent from accredited and recognized institutions. Should possess teaching/training experience in higher and tertiary education.

Special Entry: N/A
Mature Entry: N/A
Other (indicate):N/A

LEARNING OUTCOMES

1. Demonstrate an ability to analyse the higher and tertiary education context

2. Develop an understanding of teaching and learning practices in higher and tertiary education

3. Perform the core elements of the teaching task (planning, design, communication, assessment, evaluation)

4. Demonstrate an ability to infuse innovation, critical and higher-order thinking skills in teaching

5. Use a range of assessment techniques to support and evaluate student learning

6. Critically reflect on the relationship between the five pillars of Education 5.0 (Teaching, research; community engagement, innovation and industrialization).

7. Incorporate the use of ICTs in the delivery of teaching and learning **8.** Reflect on and critique their own teaching practices in relation to
student and peer assessment of their teaching.

Assessment

Coursework: For semesters one and two, the coursework shall contribute 40%.
By thesis: For semester two the research project constitutes 50% of the final mark
Written examinations: For semester one, the examination shall contribute 60% of the final mark inclusive of any practical work. For semester two the examination shall contribute 70% of the final mark inclusive of practical work. Other: Relevant prior learning

Module name	**Credits**
Level One	
Semester 1	
PTE5118 The Higher Education Context	18
PTE5101 Educational Foundations	18
PTE5304 Curriculum Design, Development and Review	18
PTE5113 E-learning in Higher Education	18

PTE5112 Research in Higher Education	18
PTE 5102 Scholarship in Further & Higher Education	18
Semester 2	
PTE 5202 Policy, professionalism & Management in HE	18
PTE5303 Teaching, Learning and Training Strategies	18
PTE5205 Student Assessment in Higher Education	18
PTE5308 Educational Management in Higher Education	18
Level Two	
Semester 1	
PTE5310 Research Project	36
PTE5302 Quality and Innovation in Higher Education	18
PTE5200 Lecture Practice and Micro-teaching	36
PTE5208 Leadership, Governance and Strategic Planning in Higher Education	18
MAX MBKs CREDITS (80%)	**216**
ADDITIONAL CREDITS (20%)	**72**
TOTAL CREDIT LOAD 100% (80% + 20%)	**288**

Module Synopses

PTE1131 Engineering Mathematics 1 Credits: 12

Indices and logarithms, formulae, mensuration, trigonometry, force and moments, estimating and costs. Series, arithmetic and geometric progressions, convergence, sum to infinity, the gradient of a curve, the chain rule, tangents and normals, increasing and decreasing functions, rates of change, and stationary points. Polynomials, discriminant, real roots, solving quadratic equations, domain, range, one-one functions, graphical illustrations. Calculus, differentiation, integration, applications of arc length, area,

volumes, moments of inertia, and centroids. Vector and scalar products. Equations of lines and planes. Matrices basic operations, rank, inverse Gaussian elimination, Cramer's rule. Determinants, Eigen values and Eigen vectors. Ordinary differential equations. Applications of First order differential equations: mechanical and electrical engineering problems. Elementary functions including Hyperbolic functions and their inverses, Differentiation technique; Leibnitz's Rule, and Hospital's Rule. Applications of differentiation: maxima and minima, kinematics. Integration techniques, Reduction formula. Integration of complex functions, integration by substitution, trigonometric relationships, trapezium rule, graphical determination, integration by parts. Applications of Integration: arc-length, area, volume, moments of inertia, centroids.

PTE1145 Engineering Drawing Credits: 12

Introduction to engineering drawing; geometrical constructions; tangency constructions; construction of ellipses; orthographic projections of simple geometrical solids and general engineering components in first and third angle; plane geometry; space geometry; dimensioning; pictorial views; freehand sketching; sectioning; intersections; developments; conventions; assembly drawings.

PTE1147 Material Science 12 credits

Materials classification and structure, atomic bonding in materials, crystallisation, dislocations, plastic deformation, temperature measurement, phase diagrams, solidification, liquidification, vaporization, alloy formation, types of material, composite, selection and their applications i.e. wood, plastics, ceramics and other alloys. Structure and properties of metals and alloys; Review of principles, Diffusional processes. Constitutional phase diagrams. Lattice defects. Deformation of metals, fracture and fatigue, polymers and corrosion. Materials for Modelling; Theories of models and model making. Imagination, creativity, innovation and invention. Image formation, model making and realization. Problem-solving, visual patterns, models, prototypes and artifacts. Material selection for designs, and experimentation with a range materials. Costs of models for designs; properties and analysis of materials for design models and product development. Testing and evaluating materials. Directory of design materials. Analysis of design case studies.

PTE1153 Circuit Theory and Networks Credits: 12

Analysis of continuous and discrete signals and systems. Topics include convolution, impulse response, system classifications, state variable formulation, and differential and difference equations.

PTE1154 Computer Engineering Credits: 12

Computer components: types of computer systems features, function of central processing unit, the motherboard, the expansion bus, system memory map, volatile/non-volatile memory storage methods. Introduction to operating systems: MSDOS, UNIX and Windows. Software development. Software life cycles, structured programming, introduction to modular design: C-constricts, introduction to programming in C. Packages: computer maintenance and diagnostic, spreadsheets**.**

PTE1175 Computers applications for engineers Credits 12

Computer hardware, Word Processing, Creating a spreadsheet (Excel) and PowerPoint Communication and information systems; commercial and general data processing.

PTE1181 Architectural Mathematics Credits: 12

Calculation of linear, curved and circular objects; measurement of surface area, volume, and density of 2-D and 3-D formations; angular measures of shapes and designs found in building and product structures.

PTE1185 Wood Chemistry Credits: 12

Chemical structure of wood and bark, cellulose, lignin, tannin, extractives, resins and gums, rubber, pyrolysis, dyes, mass spectroscopy, eco-friendly production and products.

PTE1231 Engineering Maths II Credits: 12

Series, arithmetic and geometric progressions, convergence, sum to infinity, the gradient of a curve, the chain rule, tangents and normals, increasing and decreasing functions, rates of change, stationary points. Integration of complex functions, integration by substitution, trigonometric relationships, trapezium rule, graphical determination, and integration by parts.

PTE1245 Industrial Design **Credits: 12**

Stages in the life cycle of a product, characteristics of global competition, characteristics of a competitive product, research and development, its role in the design of a product, and factors influencing the forward move of a product. Identifying customer needs and establishing a product, generic product development process, concept generation and development.

PTE1246 Engineering Mechanics I **Credits: 12**

Scalars, vectors, triangle of forces, parallelogram and polygon of forces, principle of transmissibility, Newton's laws, resolution of forces into two and three-dimensional components, position vectors, resultant forces, moments, couples, equilibrium equations, structures: types of supports, truss analysis, joint method, section method, friction in inclined plane, wedges and screws. (X-ref TIE2106/2206)

PTE1252 Electrical and Electronic Measurements **Credits: 12**

Physical quantities, SI units, Avogadro constant, scalar and vectors. Measurements, errors and uncertainty. Measurement Systems: Static characteristics of measurement instruments. Transducers: Principles of Capacitive, resistive, inductive, electromagnetic, thermoelectric, elastic, piezoelectric, piezo-resistive, electrochemical, gas, ion selective electrodes; Signal conditioners and data acquisition; Introduction to flow measurement; Radiation Measurements, Basic measuring devices, ammeters, voltmeters, transducers, accuracy, precision and components. Electronic measuring instruments, digital voltmeters, multimetres. Oscilloscopes; Measurement of AC power; Measurement of non-electrical parameters.

PTE1253 Electrical Circuits and Devices **Credits: 12**

Introduction to volt-ampere characteristics of diodes, transistors with power and photoelectronic devices. Maxwell's equation for static and harmonic varying current, displacement current, application of circuit theory, semiconductors, diodes and transistors, logic gates, NAND, NOT, NOR, OR exclusively OR, Boolean algebra, combination logic, minimization, programmable logic devices, sequential logic, arithmetic operations and circuit memory elements.

PTE1256 Workshop Technology and Safety **Credits: 12**

Workshop tools, occupational safety and health, processes and routines, construction materials, construction measuring instruments, personnel in the construction process, and construction laws. The workshop environment, safety and care of equipment, and space management. Safety and hygiene: workshop safety, ergonomic safety, Government regulations. Environmental stresses and hygiene, chemical stresses, harmful agents through inhalation, skin absorption & ingestion. Control of environmental factors. Measurement and measuring instruments, reliability, precision, scale, steel rules, callipers, micrometers, gauges, etc. Machine shop practice, marking, hand sawing, filing, drilling, and use of lathe; Equipment operation and maintenance, fabrication, welding, turning, cutting, soldering and brazing. Equipment acquisition, storage and disposal. (X-ref TIE 1103 and TIE1203)

PTE1258 Design of Structures **Credits: 12**

Introduction to structural design, design methods, and load on structures. Design in reinforced concrete. Basis of design, material properties, loading, design of beams, slabs, columns and foundations. Design in structural steelwork. Design of vertically loaded masonry walls, and design of laterally loaded wall panels. Enhancement of Auto CAD application in Civil Engineering drawings e.g. detailing, labelling and dimensioning.

PTE 1281 Applied Structural Statics and Dynamics Credits: 12

An introduction to the static and dynamic behaviour of the major structural systems applied in architecture. An examination of the monolithic wall, post-and-lintel and multistory framed construction, tunnels, vaults and domes, suspended, catenary and tensile structures, etc. to enable students to develop their understanding of the structural principles that underlay their physical structural forms. The aim of the module is to develop analytical capabilities in relating the sizes of components to their physical characteristics of structural elements and the analysis of forces acting on them.

PTE1282 Technical Drawing Credits: 12

Plane geometry, space geometry, first and third angle projection, dimensioning, pictorial views, freehand sketching, drawing of common objects, sectioning, intersections, developments, conventions, assembly drawing and exploded views. The use of AutoCAD covering the menu options of the operating screen settings, limits and control g auto CAD program. Use of basic operating commands SNAP, GRID, ORTHO, ENTER, etc. Practical lab exercises and assignments in 2D and 3D such as drawing and dimensioning of various machine parts, architectural plans, process flow charts and block diagrams.

PTE1285 Timber Mechanics (Stat & Dynamics)

Strength properties of wood. Static and dynamic behaviour of building structural systems, framed structures, walls, tunnels, lintels, vaults and domes, catenary and tensile structures, effects of loading. (X-ref AAR1206)

PTE1288 Materials and construction Credits: 12

On-site and off-site analysis of construction projects and products; selection and evaluation of materials for construction and design projects; quantitative and qualitative analysis; materials for repair jobs; (X-ref AAR1204).

PTE2146 Fluid Mechanics Credits: 12

Elements of fluid mechanics, Pressure and head, Static Forces on surfaces, Motion of fluid particles and streams, Bernoulli's equation, The momentum equation, Uniform flow in open channels, Design of hydraulic systems and control, applications of hydraulics in industry, pneumatics and cut-out systems.

PTE2147 Strength of Materials I Credits: 2

Direct stress and strain. Compound bars. Poisson's ratio and lateral strain. Hoop stress and axial stress in a cylinder. Stress in thin shells. Mechanical properties of materials, ductile and brittle materials, resilience, fatigue, creep, hardness. Sheer and torsion. Bending moment diagrams. The second moment of area. Modulus of section.

PTE2148 Maintenance Engineering Credits: 12

Maintenance and reliability, Preventative maintenance, Total productive maintenance (TPM) corrective maintenance breakdown maintenance, reliability-centered maintenance, condition-based maintenance, systems reliability – Weibull parameters. Estimating reliability – Weibull diagram.

PTE2150 Analogue Electronics Credits: 12

An introduction to stabilized power supplies, small-signal models of differential, single stage. Multistage and integrate circuit amplifiers, oscillators, waveshaping and switching circuits. High-frequency effects. Stability and performance measurement.

PTE2151 Digital Communication Credits: 12

Introduction to digital communication systems: digital signal processing, modulation, transmission, and demodulation. Propagation. Random noise, channel capacity and error control coding. Optimum receiver design principles.

PTE2152 Electrical Machines Credits: 12

Fields and magnetic circuits. Energy conversion phenomena. Three-phase theory. Transformers: principles, operation and construction. Special transformers. Principles, classification, characteristics and construction of synchronous, induction and dc

machines. Single-phase induction motors. Steady-state and transient behaviour of machines.

PTE2153 Instrumentation and Control Credits: 12

Frequency measuring instruments, frequency analysers, Counters, and Transducers. Open and closed loop controllers. Transfer functions, Simple servomechanisms, Derivation of transfer functions. Time domain, Frequency domain, Stability, Routh criterion, Root locus. Characteristics of measuring means , static characteristics, gain, sensitivity, resolution sensitivity of an instrument or a transducer; dynamic characteristics of measuring means; errors in engineering measurements. Analogue measuring instruments: flow meters, pressure gauges, thermometers, scales etc. Electronic instrumentation: sensors and transducers. AD/DA Converters. Accuracy and error of measurement.

PTE2156 Transport Engineering and Planning Credits: 12

Role of traffic and transport engineering- its scope and function. Highway surveys. Geometric design of highway, design of intersections, design of signals, markings and signs. Sight distances Horizontal and vertical curves. Construction and maintenance of low cost roads, stabilize roads, bituminous roads.

PTE2157 Construction Survey Credits: 12

Definition of the survey, SI units in the survey, Application of Plane and geodetic survey. Topographical, cadastral, hydrographic, mine photogrammetry and engineering survey. Theory of errors. Systematic and random errors. Methods of eliminating or minimizing these errors. Methods of set up. Ranging a line using a prism square. Taping. Corrections to the measured lengths. Temperature, slope, standardization, tension, reduction to mean sea level. Leveling:- dumpy, tilting, and automatic levels, Leveling of construction, longitudinal and cross-sections, grading of constructions, cut and fill work. (X-Ref TCW2102)

PTE2158 Hydraulic Design Credits: 12

Overview of hydraulic structures: conveyance structures, flow measuring devices, control structures etc. Design of municipal drainage system. Methods of analysis and

hydraulic design: conveyance structures, water distribution systems etc. Storage systems: ground and overhead reservoirs and impoundments.

PTE2180 Applied Geometry **Credits: 12**

Surface development principles, parallel radial and triangulation. Development of right and oblique-based prisms, development of special types of roofs.

PTE2181 Architectural & Structural drawing **Credits: 12**

Drawing and utilizing models, block and site plans, floor existing work, new work, elevations and sections, constructional details of key components, fixtures and jointing methods. Steel and timber structures, roof trusses, columns and steel base fixture

PTE2183 Environmental Design **Credits: 12**

An introduction to the ways in which buildings respond to and modify the environment with an emphasis on thermal, acoustic and lighting performance. Simple methods of calculation are introduced. Investigation on the climatic factors derived from several African Climatic zones, the influence of topography, surrounding buildings and open spaces on the microclimate of buildings and the principles of thermal comfort.

PTE2185 Wood structure, Quality & Processing **Credits: 12**

Forest and plantation timber, juvenile and mature timber, soft and hardwoods, tree improvement through genetics, wood ultra-structure, anatomical aspects, wood-related and supplemental materials e.g. bamboo, canes, palm, etc., Wood Seasoning, preservation & storage, Wood deterioration and destruction qualities; treatment of logs and sawn timber; fungal and insect protection; seasoning techniques; timber storage and sheds; maintenance; inspections. Sawmilling, Layouts of sawmill sites, saws and sawmilling equipment, saw doctoring, saw blade geometry, measurement of log volume, economic conversion of logs, timber scale.

PTE2187 Construction Equipment & Methods **Credits: 12**

Planning and scheduling projects; heavy and large-scale construction, building estimations; quantity surveying and pricing of labour, materials and equipment; resource management; computer-based solutions. (X-ref AQS4108)

PTE2189 Wood manufacturing systems and processes Credits: 12

Classification of systems; layout; assembly lines; scheduling; group technology; machine scheduling; production flow analysis; wood manufacturing processes. (X-ref TIE3112, TIE3113, TIE3213)

PTE2245 Engineering Design Credits: 12

Coupling design: rigid and flexible couplings, Bolt Loading, Clutches: conical and multiple disc, Brake design: band, disc, automatic braking systems, Gear design: spur, helical, bevel and worm, Rolling bearings design, Ball bearings, taper bearings, belt design, V-belt and flat belt.

PTE2246 Thermodynamics Credits: 12

Temperature scales, practical thermometers. Ideal gas: equation of state, kinetic theory of gases, pressure of a gas, kinetic energy of a molecule, work done by an ideal gas, thermal equilibrium, thermal conduction, convection, radiation. Laws of thermodynamics, the working fluid and phase equilibrium, reversible and irreversible processes, The second law of thermodynamics and Entropy, The heat engine cycles, vapour power cycles, refrigeration cycles, Turbines and compressors, Cooling systems: air, water, additives. Communication and production. Design registration and protection.

PTE2247 Strength of Materials II Credits: 12

Structures: forces in members, sheer force and bending moments diagrams. Simple bending equation and applications, slope and deflections of beams, Macaulay's method, Torsion equation and applications to hollow and solid shafts, thin cylinders, thick cylinders: Lame's theory and line, stresses in three dimensions, shear and tensible combined, Mohr's stress circle, strain in three dimensions, Mohr's strain circle.

PTE2250 Analogue Communication Credits: 12

Introduction to analogue communications; amplitude modulation; single sideband modulation and angle modulation, frequency division multiplexing, propagation effects;

demodulation. Determination of the signal-to-noise ratio in AM and FM systems. Design of small signal HF amplifiers, mixers, oscillators and detectors, mixer theory and spectral analysis, noise generation in electronic circuits and devices.

PTE2253 Design Project **Credits: 12**

The module consists of various designs that can be constructed and tested in the laboratory or computer room.

PTE2254 Digital Electronics **Credits: 12**

Boolean algebra, Combinational logic. Minimization. Karnaugh mapping. Programmable logic devices. Sequential logic. Arithmetic Operations and circuit memory elements. Operational amplifiers, classification, parameters and basic building blocks.

PTE2255 Solid Mechanics **Credits: 12**

Normal stress and strain, stress and strain relationships, elastic and plastic deformation, Hooke's law, shear stress and strain, allowable stress and allowable load. Analysis of axially loaded bars, temperature effects, stresses on inclined surfaces. Analysis of beams for shear and bending:- shear force and bending moment. Bending stresses in beams. Torsional behaviour of hollow bars, indeterminate circular shafts, elastic torsion of thin walled closed tubes. Analysis of stress and strain:- plane stresses, principal stresses, and maximum shear stresses, Mohr's circle of plane stress, Hooke's law for plane stress, spherical and cylindrical pressure vessels, triaxial stress, 3D stress, plain stress.

PTE2258 Analysis of Structures **Credits: 12**

Basic structural theory; structures and their behaviour; loads, determinacy and indeterminacy; plane and space trusses; bridge and roof trusses; long span structures – cables and arches; influence lines for statically determinate beams and trusses; strain and complementary energy; basic structural theorems, principle of virtual work. Deflection of statically determinant structures; area moment method, application of Castiglione's

theorems, unit load method, analysis of statically indeterminate structures; method of superposition, slope deflection and moment distribution; application to beams and rigid frames.

PTE2259 Environmental Engineering Credits: 12

Human activities and environmental pollution. Plumbing, drainage, Objectives of wastewater treatment. Wastewater characteristics BOD kinetics. Wastewater flow rates and design flows. Flow equalization, wastewater treatment processes and selection. Design, operation and management of plant.

PTE 2281 Building construction Credits: 12

The module examines the construction process and the materials used in construction through lectures, case studies and project assignments. Students shall be required to study a building under construction and create a portfolio for documenting the project.

PTE2287 Wood machines & Maintenance Engineering Credits: 12

Rationale for maintenance; types of maintenance; machine maintenance operations and organization; investigative maintenance; repair, replacement and monitoring; systems reliability; engineering tools and solutions. (X-ref TIE2110; TIE3110).

PTE2289 Wood finishes Credits: 12

Planning and applying wood finishes; Surface Coatings, 'Natural' Finishes, pigmented Finishes, penetrating finish, and waxing; Finishing Techniques**;** Staining, Glazing and Toning, Pickling and Liming, Bleaching, Distressing

PTE4146 Engineering Mechanics II Credits: 12

Dynamics of a particle, force, mass, acceleration, work and energy, Impulse of energy and momentum, special applications, dynamics of a system of particles, conservation of energy and momentum, introduction to three-dimensional dynamics of a rigid body,

angular momentum, KE, momentum and energy equations, parallel plane motion, gyroscope motion, are moments of inertia, mass moment of inertia, mass moment of inertia about an axis, products of inertia. (X-ref TIE2106/2206)

PTE4149 Manufacturing Technology and Processes Credits: 12

Casting processes, solidification of castings, gating and feeding systems, mould materials and their testing, continuous casting, special processes, design of castings, casting defects, inspection and quality control. Benchwork, marking and setting out. Powder metallurgy: production of metal powders, their characteristics, purity, grain size etc. control and testing, pretreatments, pressing, lubricants, sintering, injection moulding, film blowing, cindering, mixing, extrusion. Machining processes: metal cutting tools, mechanics of chip removal, economics of cutting, cutting processes, turning, milling, sawing, thread cutting, metal removal rate calculations, grinding. Non-traditional machining processes, Rapid prototyping techniques.

PTE4156 Electrical Installations and Appliances Credits: 12

Domestic installation, domestic appliances and conduit work.

PTE4157 Geotechnical Engineering Credits: 12

Important subjects include principles of effective stress and the shear strength of soil. Strain-stress behaviour. Soil stiffness. Lateral earth pressure. Moor-Coulomb and Rankin approaches. Consolidation theory and permeability. Gravity and sheet piling. Behaviour of piles. Seepage. Bearing capacity and slope stability. Critical soil model. The ultimate capacity of shallow foundations.

PTE4181 Building Services Credits: 12

The infrastructural services required in buildings including water supply and distribution, hot water supply and distribution of solid waste and rainwater drainage, sewage treatment

and its disposal, refuse removal and disposal, electrical and telephone services for buildings, ventilation, air conditioning and acoustics.

PTE4184 Computer-aided Architectural Design Credits: 12

Thinking skills, creativity and expression provides a practical introduction to the use of computers in design, various electronic graphic representation used in design, and functionality and the structure of modern CAD systems. Students are then given a theoretical and practical introduction to computer-based and drawing tools and techniques through lectures and hands-on instruction and demonstration.

PTE4186 Furniture & Cabinet Construction Credits: 12

Interpretation of plans and drawings, measurement, shop and office geometry, hand, portable power and stationary power tools, joinery and assembly, small, medium and large-scale projects, shelves, drawers and doors, materials and processes.

PTE4249 Manufacturing Systems Credits: 12

Classification of manufacturing systems, project, batch, line, continuous, facility layout and design: problems that stimulate facility layout design, locating new facilities, Assembly lines, Flow line design, Approaches to line balancing: Ranked positional weight, Largest candidate Rule, Kibridge and Western method, Practical issues in line balancing, sequencing of a mixed model, improvements to solutions on line balance, GT Cellular manufacturing, scheduling.

PTE4252 Instrumentation and Control II Credits: 12

Frequency measuring instruments, Frequency analysers; Counters; Transducers and sensors; Open and closed loop controllers. Transfer functions. Simple servomechanisms, Derivation of transfer functions. Time domain, Frequency domain, Stability, Routh Criterion, Root Locus. Programmable logic controllers (PLCs), Distributed Control Systems (DCCs); Supervisory Control and Data Acquisition (SCADA) packages; Time domain and frequency domain system modelling; representation and reduction of multiple systems (block diagram techniques); stability; steady state errors (accuracy);

frequency response methods, PID controllers compensation; programmable logic controllers (PLCs); introduction to state space methods.

PTE4254 Microprocessors and microcontrollers Credits: 12

Basic concepts of microprocessors. Architecture and operation. Instruction sets and assembly language programming. Subroutine, interrupts, programmed controlled I/O: I/O operations. I/O memory mapped. I/O ports. Programmable LSI ports. Applications of microprocessors.

PTE4259 Geotechnical Engineering II Credits: 12

Geo-structural mechanisms and the critical state soil model. Bearing capacity and design of foundations. Settlement of foundations and analysis. Geotechnical process for ground improvement. Construction methods, dams and embankments. Soil improvement grouting vertical drains, geosynthesis, soil reinforcement. Filtration, separation and erosion control. Drainage in plane. Flow prevention. Gravity retaining walls and design. Pile construction, flexible and rigid pipes and deep in situ walls.

PTE5118 The Higher Education Context Credits 18

Tertiary, vocational and higher education systems in Zimbabwe; further education and training; history of higher education in Zimbabwe, the psycho-social context of higher education; physical and social learning environments; culture, diversity and inclusivity in higher education; multicultural education; social change and education; socialization; agents of socialization - family, peer group, mass media, university, religion; gender and education: empowerment, gender mainstreaming in higher education; understanding adolescent and mature students; professional ethics; higher education in the technological era.

PTE5101 Educational Foundations Credits 18

Philosophy of Education – Introduction to the Philosophy of Education – the nature and functions of philosophy in education; branches of philosophy; epistemology, metaphysics (ontology), axiology, semantics and logic; Critical thinking; types and forms of knowledge, Importance of the discipline to a higher education practitioner, Philosophical orientations and philosophical theories. Implications of Philosophical Foundations on Education 5.0 doctrine.

History of education – Historical influences on higher education in Western society; History of higher education in Zimbabwe; Chetsanga Report (1995) and Nziramasanga Presidential Commission of Inquiry (1999). Implications of Historical . Foundations of Education to Education 5.0 doctrine.

Sociology of Education – Introduction to Sociology of Education; history of the sociology of education; importance of the discipline to a higher education practitioner; dominant contemporary theories; sociological perspectives of education; the nature of society and social structure; higher education and culture; multiculturalism. Implications of Sociological Foundations of Education to Education 5.0 philosophy.

Psychology of Education - Introduction to Psychology of Education; importance of the discipline to a higher education practitioner; theories of learning; student counseling.

PTE5304 Curriculum Design, Development and Review Credits 18

The curriculum: definition(s), models of curriculum design, components, elements and types and stakeholders of curricula; The three taxonomies of learning domains, Bloom's taxonomy of learning domains; Anderson and Krathwohl's revision of Bloom's taxonomy; the silent curriculum; types of curricula; curriculum development: curriculum design, planning, implementation, monitoring and evaluation; module writing; open and distance learning (ODL) packaging; infusing contemporary issues into curriculum design (gender, culture, disability, ethics, citizenship education, heritage based education);indicators of a sustainable curriculum; curriculum assessment, evaluation, analysis and review; evaluation models; rationale for curriculum review; key players in the review process; documenting and implementing the results of the review process; educational philosophy and curriculum design.

PTE5113 E-Learning in Higher Education Credits 18

Synchronous and asynchronous learning; file management; MS word processing (adding hyperlinks in a document, print screen from paint to word, mail merging, using developer, designing innovative and commercialisable teaching/learning content; Statistical packages, PowerPoint for instruction; spreadsheets; virtual classrooms and laboratories; multimedia; smart classrooms; message boards; folder sharing; using the Internet for research; using social media for teaching/training and learning; designing online questionnaires/surveys; website design, hyperlinks, uploading teaching material (wiki spaces, moodle, e-learning portal, MOOCS); e-marking; online tests; conference lectures; referencing software (such as Endnote, in-word, Mendeley desktop); anti-plagiarism software; e-resources (online journals) meta-search engines.

PTE5112 Research in Higher Education Credits 18

Sources and nature of knowledge; the research process; perspectives on social science research; ethical issues in educational research; Problem identification and role of research in Zimbabwean, selecting and developing research questions; conducting literature reviews; research approaches: qualitative, quantitative, mixed methods; research design and process; research methods; data collection techniques; population and sampling methods: sampling theory, probability sampling, non-probability sampling; credibility issues; approaches to analysing and interpreting data; analysing data using statistical software; qualitative data analysis software; research proposal; supervising research; research mentoring; academic writing for publication.

PTE5303 Teaching, Learning and Training Strategies Credits 18

This course is designed to encourage the lecturer/trainer to incorporate a variety of teaching/training methods to cater for the different needs of the different types of student in their classes. Lecturing has been the most common method but the new trend has been to move to more innovative, interactive, participatory and collaborative methods. The course will impart strategies of enriching students' learning experiences and will endeavor to produce practitioners capable of meeting a wide range of instructional delivery challenges in higher and tertiary education. The use of technology and other techniques that make the learning experience more interesting than the traditional "chalk and talk" method will be explored. The course will also develop innovative training and facilitation skills in students in line with the Education 5.0 doctrine.

The course will include andragogical principles; the adult learner; improving student throughput; conditions of learning; learning styles; motivation; effective teaching, training, facilitation and learning approaches: active/ interactive methods/approaches and strategies; instructional delivery; preparation, presentation, participation; practice with feedback; performance assessment; teaching large classes; approaches, challenges, reflections on theory and practice; self-directed learning. Innovative teaching, learning and training strategies vis-à-vis Education 5.0 doctrine

PTE5200 Lecture Practice and Micro-teaching Credits 18

The participant is expected to demonstrate the innovative skills and strategies of teaching, training and facilitation acquired during the taught components of the course. The use of e-learning in teaching is a mandatory requirement for this component. Each student will be assessed through a microteaching session and two lecture presentations. Lecture preparation; layout of presentation; lecture execution; introduction; development; application; closure/conclusion; methods; use of multimedia; application to real life; content mastery; professional aspects: attitude/conduct, dress and appearance, language use, voice projection, time management, rapport; documentation: resource file, course outlines, lecture presentations, lecture evaluations; general comments/advice: lecture post mortem.

PTE5205 Student Assessment in Higher Education 18 Credits

The theory and practice of student assessment; types of assessment including formative and summative assessment; criterion-referenced and norm-referenced assessment; outcomes-based teaching and learning; problem-based learning; objectives, student learning outcomes and measurement; designing and assessing learning; Bloom's taxonomy of learning domains; beyond Bloom's taxonomy Anderson & Krathwohl's revision of Bloom's taxonomy including assessing innovation and creativity, item writing for tests and administering examinations; item analysis; developing marking guides; e-assessment, grading tests and examinations; moderation of examination papers for quality control; analysis of examinations; grading and grade point averages; internal and external assessor's reports; student support; academic integrity and plagiarism;

scoring research; assessing practical work, attachment supervision; the university credit system.

PTE5308 Educational Management in Higher Education 18 Credits

Management in educational institutions: definitions, organizational organogram, formal and informal organisations, management theories; principles and functions of management; culture and management; management and lifelong learning; policy in higher and tertiary education: policy design, the policy cycle; quality management in higher and tertiary education: the purpose of quality assurance in higher and tertiary education, quality assurance structures, quality enhancement, student involvement in quality assurance, internal quality assurance instruments; leadership in educational institutions: definition, styles, theories and evaluation of leadership effectiveness; management, personal attributes, professional ethics.

PTE5310 Research project 36 Credits

The student is expected to demonstrate the ability to apply knowledge and techniques on teaching and learning practice acquired during the taught components of the programme in the following ways: frame the problem statement, use of appropriate methodology, and appropriate research instruments, coming up with significant findings, and making appropriate conclusions and recommendations. The project should be innovative and result in either goods or services (e.g. prototypes, patents, published articles).

PTE5102 Scholarship in Further and Higher Education 18 Credits

The nature of academic work in modern universities and colleges, expectations, challenges, comparisons with other professions, and adaptations to change. Lecturer performance, effectiveness, job detailing and appraisal. Teaching, research and community service.

PTE5202 Policy, professionalism and management in Higher Education 18 Credits

Policy formulation and implementation, decision-making strategies in organizations and communities; policy and educational reform; dominant policies in Zimbabwe education, Resources management: human, financial, material, time; Principles of project planning and management, factors affecting project management: Political, Economic, Social, Technical, Legal and Environmental (PESTLE); Budgeting; Risk and Contingency Management; Research in Management.

PTE5208 Leadership, Governance and Strategic Planning in HE

18 Credits

Institutional organization; academic and administrative leadership, principles and tools for good governance, the role of the state. Local, regional and international cooperation between institutions. Strategic Planning principles and processes.

PTE6146 Environmentally Conscious Engineering Credits: 18

Cleaner production concepts. Eco-design. Explosive and toxic gases, liquid and metallic poisons. Airborne dust - causes and prevention. Physiological effects of vitiated and contaminated air. Compiling of a monitoring strategy, and management systems for environmental control. Environmental auditing.

PTE6153 Linear Systems Credits: 18

Linear Vector Spaces, Functions and Linear Transformations, Normed Linear Spaces, Differential Equations and Dynamical Systems, Reachability and Controllability, Decomposition Theory for LTI systems, Observability and State Reconstruction

PTE6156 Environmental Engineering & Water Resources Credits: 18

Human activities and environmental pollution. Understanding of the role transport processes play in natural and engineered systems which control the quality and quantity of water for human use. The scope includes concerns in toxic and hazardous waste management with a focus on aspects of chemical transport between air, water and soil systems, and microbial degradation processes in the natural and engineering environment. A particular emphasis is placed on recognizing and modeling processes that are potentially transport-limited and to what degree such limitations may be overcome. Wastewater characteristics. BOD kinetics. Wastewater flow rates and design flows. Introduction to microbial metabolism and role of micro-organisms in biological treatment. Kinetics of biological growth. Landfill Engineering, Urban Hydrology & Urban Drainage.

PTE6159 Structural Design in Concrete & Steel Credits: 18

Concrete design: limit state, ultimate state, characteristic material strength, stress, yield, shear and calculations. Concrete structures: calculations. Concrete design tool. Reinforced concrete: magnitudes, stresses, calculations.

PTE6180 Architectural Design and Drawings Credits: 18

Plans, sketches, presentation, art, landscape, perspective, axonometric.

PTE 6182 Advanced Design and Manufacturing Credits: 18

Product design, technology for sustainability, advanced manufacturing technology, web and internet technologies, and multidisciplinary engineering technologies.

PTE6188 Advanced Material Science Credits: 18

Materials processing, structural materials, functional materials, and materials for sustainable technology material characterisation.

PDT6245 Human Factor Engineering Credits: 18

Work Study: method study, time study, motion economy. Ergonomics: man-machine interaction, work conditions. Industrial psychology. Biomechanical models of humans at work.

PDT6246 Production Management Credits: 18

Construction and design, budget management, event management and health and safety.

PTE6247 Material Technology Credits: 18

Wood-based hybrid materials, bionics, material emissions, material characterisation and innovative material technology.

PDT6248 Computer Control and Manufacturing Systems Credits: 18

Analysis of microprocessor controlled servo loops, adaptative control, state space methods in controlling analysis of NC machines, robots and their controllers; programmable controllers. *Prerequisites*: - Industrial Instrumentation and Control

PTE6253 Electronic, Power Sources and Circuits Credits: 18

Power sources: characteristics of AC and DC current, principles of step down/up, rectification, voltage and current regulation, Ohm's Law, power, and use meters to measure voltage, current and resistance. Electronics and control: reed switch, micro switch and relay, transistors (NPN and PNP types) as an amplifier and switch and define current gain, a Darlington Pair, capacitors, diodes for rectification and protection against back emf, zeners for voltage reference, LEDs and photodiodes, resistors , transducers, calculate resistance of series and parallel resistors. Circuits: draw circuit diagrams including – switching using the output to operate transistors and relays. Operational amplifiers , explain the functions of AND, OR, NAND, NOR and XOR, construct truth tables for the above functions.

PTE6254 Intelligent Conditioning and Monitoring Credits: 18

Introduction – Role of sensors in manufacturing automation – operation principles of different sensors – electrical, optical, acoustic, pneumatic, magnetic, electro-optical and vision sensors. Condition monitoring of manufacturing systems – principles – sensors for monitoring force, vibration and noise, selection of sensors and monitoring techniques. Acoustic emission – principles and applications – concepts of pattern recognition. Sensors for CNC machine tools – linear and angular position and velocity sensors. Automatic identification techniques for shop floor control – optical character and machine vision sensors – smart/intelligent sensors – integrated sensors, Robot sensors, Microsensors, Nanosensors. Manufacturing of semiconductor sensors and fibre optic sensors – principles, applications.

PTE6256 Surface Water Modelling Credits: 18

Hydrologic cycle. Water balance: Evaporation, infiltration, overland flow, base flow. Rainfall-runoff models, overland flow models. Stream flow discharge and rating curve. Advanced flood routing. Stochastic hydrology. Statistical analysis of hydrologic events

PTE6280 Advanced Engineering Science Credits: 18

Materials processing, structural materials, functional materials, materials for sustainable technology material characterisation.

PTE6346 Management of Technology Credits: 18

Technology. Technology transfer. Research and development infrastructure, interaction, and cooperation. Technology and its environment - social, human, political factors. Managing innovation and technology dynamics. Change dynamics.

PTE6352 Electronics Design Credits: 18

Study circuit and component technologies in contemporary very large scale and very large scale integrated circuits. Use of the Computer-Aided Design workstation to produce complete circuits related to area of specialization. Design circuits in special construction of your choice.

PTE6356 The Sustainable Environment Credits: 18

Contemporary social and environmental policy issues and research themes, such as: development and displacement, the transnational dimensions of environmental issues, access to wood in urban areas, urban planning and sustainability, the social production of risk, and resource extraction and conservation conflicts.

PTE6357 Ground Water Modelling Credits: 18

Classification of groundwater systems. Aquifer parameters and properties. Flow and contaminant transport equations. Well hydraulics and parameter estimation. Well development. Artificial Recharge. Numerical modelling of aquifer systems. Use of groundwater models. See page and drainage problems.

PST6381 Integrated Building Services Credits: 18

How various types of building services equipment work and how they are integrated into a building. Heating cooling, lighting, energy supply, on-site power generation, building management systems, water supply and waste systems, fire safety, vertical transportation and building services for high-performance buildings. Short and long-term maintenance contracts to the commercial, retail and construction sectors throughout

PTE6387 Advanced Wood Processing Credits: 18

Chemical pulping of eucalypts (collaboration of Western Australian Forestry and a number of pulp and paper companies (APM, APPM, and ANM); Chemical pulping of eucalyptus is now the dominant process used world-wide for the manufacture of fine writing paper, High temperature drying of pine (CSIRO in collaboration with NSW and

Queensland Forestry Commission Laboratories) Machine stress grading of pine, Wood-fibre-reinforced cement composites (CSIRO and James Hardie), Advanced breeding and selection technology for pine (CSIRO/State Forestry Services).Introduction to Wood Finishing, Colour Theory and Wood Colour, Surface Preparation, Surface Finishes, Spraying Technology, Automated Finishing, Drying and Curing of Finishes, Post-Treatments and Cost Considerations, Coating Parameters, Recycling, Safety, Environmental, Quality Control and Finish Testing, Measuring the colour of Canadian wood species, Farnsworth-Munsell colour test, Finish sanding and surface preparation, Conditioning of surfaces for staining, Spraying basics – gun setup, correct use, and cleaning, Staining effects & simple finishes, chemical staining, Advanced staining systems, Preparing bleaches and removing stains from wood, Tests on liquid finishes, Tests on wet coatings, Water-based finishes, Roller coating, UV curing, Curtain coating, Powder coating of MDF, Achieving special finishing effects, Exterior finishes and testing, Testing the properties of finishes, Tours of various industrial finishing facilities.

PTE6388 Timber Engineering Credits: 18

Timber and hybrid structures, multi - story timbers buildings, assessment and retrofitting, methods of assessment, maintenance and strengthening, remodelling, densification, structural dynamics, lateral force method, modal response, spectrum analysis.

PDT6446 Engineering Project management Credits: 18

The entrepreneur, project planning, implementation and review, decision making factors, problem formulation and solution using optimisation theory, finite mathematics, and statistical techniques.

PDT6448 Automation and Robotics Credits: 18

Industrial Robots: An introduction to industrial robots; Classification of robots and their geometries; Robot end-effectors (tooling and grippers); Safety considerations. Programming Industrial Robots: Robot motion control; resolution, repeatability, accuracy and control; Future trends. Robot Animation Teaching Simulation; Robotics Sensing: Robot sensor technologies; Image acquisition; Computer vision systems: Image processing; Robot programming using sensors; Automated Assembly: Image processing; transfer and parts presentation; Requirements for general purpose assembly; Some problems with assembly; Design considerations in automated assembly; principles of

high volume manufacturing systems. Choosing, specifying and justifying a robot system: Evaluation methods for robot capital investment; Evaluation of manufacturing costs.

PTE6449 Quality Systems Credits: 18

Total quality management: overview, principles, levels of adoption. Pioneering works of Deming, Juran, Crosby, Ishikawa, Imai, Shingo and Fiegenbaum. International Standards:

Malcom Baldridge, ISO 9000, ISO 14 000. Cost of quality. Quality function deployment. Quality loss function. Total quality tools and techniques.

PTE6456 Water, Resources Planning and Management Credits: 18

Planning economics. Quantitative optimization methods applied to water resources planning. Waste recycling practices. Planning under uncertainty. Conjunctive use of surface and groundwater resources. Water legislation and administration. Experiences from professionals in industry on water resource planning and management.

PTE6458 Advanced Construction Credits: 18

Management of technology, processes and projects, its technological interdependencies and socio-economical boundary constraints, results in the worldwide uniqueness of our program, New technologies, processes and strategies for designing and producing of buildings: Faster return on investment through implementation of rapid project delivery and zero defect construction by robot oriented design and automated construction systems, Integration of intelligent systems in daily life and environments: Microsystems and microelectronics increasingly form a part of our everyday's life. Its miniaturization allows its incorporation in domestic systems and appliances. Simultaneously we want to deal with a standardized and compatible network of synergetic subsystems rather than detached island solutions, Life cycle management, value engineering and innovation.

PTE6459 Environmental Engineering and Management Credits: 18

Environmental issues: solid and liquid wastes management. Water and air quality monitoring and modelling:- monitoring methods, analytical and numerical modelling methods. Environmental Impact Assessment. legal and institutional issues on

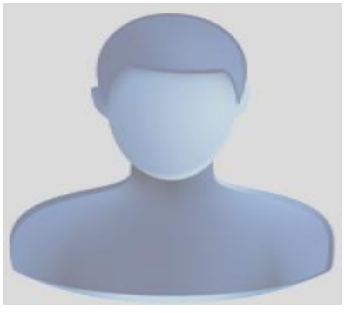
environmental management. Public Health issues. Water and Sewerage Network Operation and Management. Environment and Sustainable Development.

PST 6461 Entrepreneurship Credits: 18

The objective of this module is to examine the characteristics and goals of the social entrepreneur as well as an in-depth view into the practices of creating social value for individuals and communities. The student's ability to develop and implement social change will increase significantly as the student becomes acquainted with the theories of social entrepreneurship and learns how to identify the characteristics of the social entrepreneur. Upon completion of this recommended module, the student will also be able to evaluate the organisational structure, human resources, funding, marketing and stakeholder participation; all vital success factors in a social change project. The study of the theories and practice of creating partnerships for social change, the aptitude to resource initiatives to link community needs and the talent to develop a plan to implement social change will all be covered in this study of social entrepreneurship.

DEPARTMENTAL STAFF

Profile Picture



Chairperson: Mr Sipo Ndlovu

Qualifications

1. Master of Technology Education Degree in Design and Technology, National University of Science and Technology, 2018
2. Bachelor of Education Degree in Technical Graphics, University of Zimbabwe, 2003
3. Diploma in Education, University of Zimbabwe, 1998
4. National Certificate in Technical Graphics, HEXCO, 1997

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sipondlovu@gmail.com

RESEARCH & PUBLICATIONS

Muleya, J. D., Ndiweni, M. N., Ronney, T., & Ndlovu, S. (2022, May). The Sustainability of the Use of Virtual Laboratories: A Literature Review. International Journal of Innovative Science and Research Technology, 7(5), 1047-1050

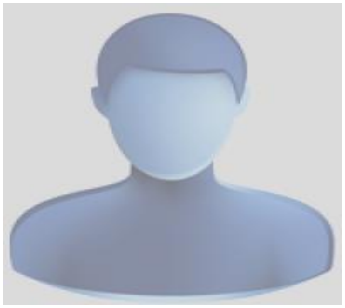
Acting Secretary

Ms Chiedza Zhou

National Certificate in Secretarial Studies

Bulawayo Polytechnic

Profile Picture



Lecturer: Mr Tapiwa Muzari

Qualifications

1. Master of Technology Education Degree in Wood Science and Technology Science (October 2020) National University of Science and Technology (NUST) Zimbabwe Passing with a Distinction
2. Bachelor of Education (Honours) Degree in Wood Technology (November 2017)National University of Science and Technology (NUST) Zimbabwe Passing with First Division (1)
3. National Diploma in Wood Technology (Design and Manufacturing) 2012-2014 Mutare Polytechnic Zimbabwe
4. Certificate of Skilled Worker Qualification- Wood Machinist (Journeyman Class 1) 2013 Industrial Training and Trade Testing Department (ITTD) Zimbabwe Diploma in Education (May 2006) Morgenster Teachers College [Affiliate of the University of Zimbabwe] Zimbabwe
5. National Certificate in Wood Machining and Manufacturing Technology 2000 -2002 Harare Polytechnic Zimbabwe
6. Certificate in Introduction to Personnel, Training, Labour and Business 2006 Institute of Personnel Management of Zimbabwe(IPMZ) Zimbabwe Diploma in Project Management 2015 Regional Partnership for Resource Development (An Affiliate of Commonwealth Open University) Kenya

RESEARCH & PUBLICATIONS

1. **Muzari, T**., Shava, G.N. & Shonhiwa, S. (2022) Qualitative Research Paradigm, a Key Research Design for Educational Researchers, Processes and Procedures: A Theoretical Overview. Vol-03 Iss-01 2022 in Indiana Journal of Humanities and Social. ISSN (Online)- 2582-8630

2. **Muzari, T**., Chasokela, D. & Sithole, A. (2022) Computer Integrated Manufacturing sub-systems in Technical and Vocational Education and Training: A bewilderment for Stakeholders in Polytechnics in Zimbabwe. Vol.-3, Iss. -3 (Mar, 2022) in Indiana Journal of Humanities and Social. IJHSS-154-2022. ISSN NO- 2582-8630

3. Chasokela, D.,**Muzari ,T**.& Tshuma,S.L.(2022) Indiana Journal of Humanities and Social Vol-3,Iss 4 Page,33-42 ISSN NO- 2582-8630
4. Ruvengo, L., Shava, G.N.**,** Manokore,K.,Mkwelie,N.,**Muzari,T** Gwebu N., (2022) Moving from the Edge to the Centre; the Role of Zimbabwe Higher Education in Achieving Education for Sustainable Development: Addressing the Quality Imperative. Volume: 1 Issue: 15 Pages: 78-84(November,2022) in International Journal of Research in Academic World E-ISSN: 2583-1615 Impact Factor (SJIF): 4.714
5. Shava G.N.,Manokore K.,**Muzari T**.,Gwebu N.,Hlongwane J. & Ruvengo L.(2023) The Paradox of Leadership and Gender ,Women in Higher Education Management :The Zimbabwean perspective.Volume VII Issue 1 Pages 201-218(January 2023) in International Journal of Research and Innovation in Social Science (IJRISS) ISSN No.2454-6186 DOI:10.47772/IJRISS
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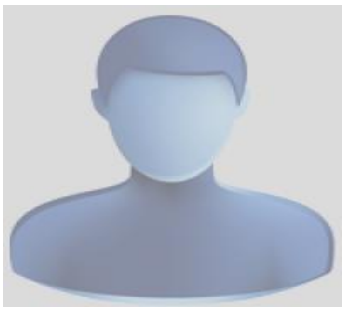
Profile Picture

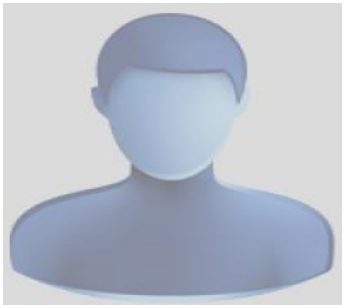


Lecturer: Mr Aleck Sithole

Qualifications

1. Master of Technology Education Degree in Civil & Construction Engineering, National University of Science and Technology, 2019
2. Bachelor of Technology Education Honours Degree in Civil and Construction Engineering, National University of Science and Technology
3. Higher national Diploma in Civil Engineering, HEXCO
4. National Diploma in Construction Design &Technology, HEXCO.
5. Diploma in Education, University of Zimbabwe
6. National Certificate (WREng), HEXCO
7. National certificate in Brick and Block laying, HEXCO
8. Skilled Worker Class 1, Brick and Block laying.

Profile Picture



Senior Lecturer: Mrs Doris Chasokela

Qualifications

1. Master in Engineering & ICT, Southwest Jiaotong University, CHINA 2012
2. BTech in Electrical & Electronic Engineering Education, NUST, ZIMBABWE 2009
3. Diploma in Tech Voc Education, GWERU POLYTECHNIC, ZIMBABWE 2005

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RESEARCH & PUBLICATIONS

1. Shava, G.N. and Chasokela D. (2020) So Few Women in Leadership Positions. DOI:10.1007/978-3-030-43042-9_46-1. The Education System of Africa (pp1-15). Springer.
2. Manokore, K.; Tlou, F.; Mkwelie, N.; Phuthi , N.; Shava, G.N.; Mhlanga, E.; Mangena, A.; Sibanda, Z. and Chasokela, D. (2022) Quality Higher Education for Sustainable Development: The Transition towards Achieving Agenda 2030 Global Goals 1. International Journal of Latest Research in Humanities and Social Science (IJLRHSS) Volume 05 - Issue 02, 2022 www.ijlrhss.com || PP. 09-21 9 | Page www.ijlrhss.com
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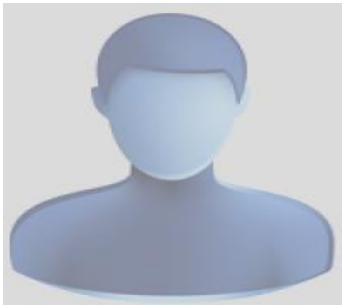

Lecturer: Makokoro Prince

Qualifications

1. Master of Technology education in Civil and Construction Engineering, National University of Science and Technology, Zimbabwe,2019
2. Bachelor of Technology Education, Building Technology and Design, UZ, Zimbabwe, 2017
3. Registered Civil and Construction Engineer, Zimbabwe Institution of Engineers, Zimbabwe, 2020
4. Diploma in Education, Building Technology and Design, BTTC, Zimbabwe, 2005.
5. National Certificate in Brick and Blocklaying, BTTC, Zimbabwe, 2004
6. Journeyman Class 1 Bricklayer, Zimbabwe Manpower Development, Zimbabwe, 2008

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RESEARCH & PUBLICATIONS

1. Muleya, J. D., Ziweya, P., & Makokoro, P. (2022). Women's Access to Communal Land: A Case Study of Siabuwa, Binga, Zimbabwe. *International Journal of Research in Academic World, 1*.
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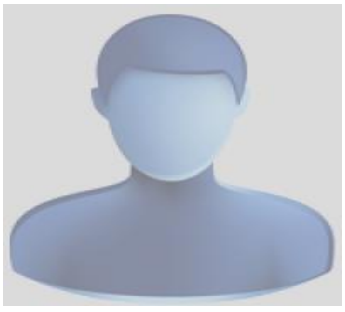
Profile Picture



Lecturer: Professor George. N. Shava

Qualifications

1. PhD Education Management: Zimbabwe Open University 2012
2. Master of Education: Education Management and policy studies. University of Fort Hare (RSA), 2002
3. Bachelor of Education (Management) University of Zimbabwe, 1999
4. Further Education Teachers' Diploma, Zimbabwe, 2000
5. Certificate in Education, United College of Education, 1988

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RESEARCH & PUBLICATIONS

1. Manokore K., Sibanda L., Shava G., Mangena A., Muzari T., Sibanda Z., Mkwelie N, (2023) Integrating Child Art as a Pedagogical Strategy for Teaching Science, Technology, Engineering and Mathematics at Early Childhood Development Level in Bulawayo Central District, Zimbabwe. British Journal of Multidisciplinary and Advanced Studies: 4(5) 1-20, 2023
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6. Stephen H.O., Silas.S. Shava GN (2022). Sustainability through Vegetable Goat Skin Tanning in Mwenezi District in Zimbabwe: Opportunities and Challenges. Indiana Journal of Humanities and Social Sciences. 3(12) 10-18.
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13. Charumbira J., Shava G. Ndlovu MJ, (2022). A Network Modelling of Supply Chain Co-ordination in the Zimbabwean Agro Processing Sector. Indiana Journal of Agriculture and Life Sciences : ISSN 2583-1623p 1-9
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18. B.Ngwenya., MJ. Ndlovu., G Shava., E. Zulu., S. Shonhiwa. (2022). Effectiveness of Strategic Communication Tools in Enhancing Local Authorities Operations, the Zimbabwean Experiences: Indiana Journal of Humanities and Social Sciences V3(3) pg 13-27.
19. L.Mahlangu., MJ Ndlovu., B.Ncube., G.Shava. (2022). Applying the Marketing Concept as a Strategic Business Tool to the Small to Medium Enterprises in the Retail Sector. International Journal of Research in Education, Humanities and Commerce. Vl 03(2) March-April 2022pg 112-132
20. W. Khupe, MJ.Nlovu., G.Shava .,E.Zulu., S Shonhiwa (2022). Challenges Facing Progression on Disabled Persons Toward Senior Management Positions in the National Association of Societies for the Care of the Handicapped Members in Zimbabwe. International Journal of Research in Education, Humanities and Commerce. Vl 03(2) March-April 2022pg 89-111
21. Shava, GN ., Tlou F., and Shonhiwa S. (2022). Grounded Theory in Educational Research: A Literature Review of Features and Processes. International Journal of Advanced International Disciplinary Research Studies. Int.j.multidisc.res.stud 2022: 2(1): 198-205.
22. K.Manokore, F. Tlou, N.Mkwelie, N Phuthi, GN Shava, EMhlanga , A. Mangena, Z. Sibanda, D. Chasokela (2020). Quality Higher Education for Sustainable Development: The Transition towards Achieving Agenda 2030 Global Goals. International Journal of Latest Research in Humanities and Social Science (IJLRHSS) Volume 05 –Isuue02-2022, www.ijlrhss//pp.09-21

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24. GN Shava, S Hleza, M J Ndlovu, P Makorokoro, F.Tlou(2022). Towards Achieving Quality in Distance Higher Education Teaching and Learning: Experiences from Zimbabwe. . International Journal of Research and Innovation in Social Science (IJRISS) Vol .VI. Issue 1 January 2022 . ISSN 2454-6186pp 14-20.
25. T.Muzari, GN Shava, S,Shonhiwa (2022). Qualitative Research Paradigm for Educational Researchers, Processes and Procedures: Theoretical overview. Indian Journal of Humanities and Social Sciences Vol 3(1) 14-20
26. GN Shava., S Hleza., E Mathonsi., S Shonhiwa., N. Hlabangana (2021). Towards Achieving Innovation through Maintaining Sustainable Developmen Goal4 on Quality Higher Education the Southern African Perspective. International Journal of Research and Innovation in Social Science (IJRISS) Vol .V. Issue XXX December 2021 July 2021. ISSN 2454-6186pp 188-201.
27. GN Shava., K. Manokore., E.Mhlanga., M.Mpofu., NPhuthi., N.Mkwelie., A.Mangena.(2021). Mainstreaming Education for Sustainable Development, the Transition towards Achieving Sustainable Development Goal 4 on Quality in Higher Education. International Journal of Research in Education Humanities and Commerce Vol 02, Issue 06pp 69-88 November December 2021
28. GN Shava, FN Tlou, S Shonhiwa, S Hleza(2021). Quality and Education for Sustainable Development, Challenges towards a Transition in Zimbabwean Higher Education: Indian Journal of Humanities and Social Sciences 2(11) 17-29
29. GN Shava, S Shonhiwa, S Hleza, SJ Ngwenya (2021). Implementing Agenda 2030 Global Goals on Education for Sustainable Development, Towards Achieving Innovation, Elaborating the Role of Structure and Agency Theoretical View Point in Zimbabwean Higher Education. Indian Journal of Humanities and Social Sciences. 2(9) 1-12
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31. GN. Shava, D. Nkengebeza, N.Phuthi, KD. Mpuang, J. Alava (2021). Achieving Sustainable Development Goal (SDG)4 on Quality in Education Challenges and Opportunities, Experiences from Southern African (SADC) Universities. International Journal of Research and Innovation in Social Science (IJRISS) Vol .V. Issue VII July 2021. ISSN 2454-6186pp 559-573.
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33. GN. Shava, M. Sithole, H. Moyo, N. Mupezeni (2021). Implementation of Quality Assurence Standards in Zimbabwean Context of Higher Education, What are the Challenges? International Journal of Research and Innovation in Social Science (IJRISS) Vol .V. Issue VI June 2021. ISSN 2454-6186pp 659-668
34. GN. Shava, S.Ndlovu, EMathonsi, S. Hleza, N.Tshuma (2021). Achieving Quality and Education for Sustainable Development in higher Education Management, the Zimbabwean. Experiences? International Journal of Research and Innovation in Social Science (IJRISS) Vol V. Issue VI June 2021. ISSN 2454-6186pp 679-689
35. GN. Shava, S. Shonhiwa, SJ. Ngwenya, D Moyo.(2021). Examining the Policy Implications on Massification of Higher Education in Zimbabwe how Quality was Inevitably Compromised. International Journal of Research and Innovation in Social Science (IJRISS) Vol V. Issue VI June 2021. ISSN 2454-6186pp 595-603
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37. K. Manokore, GN Shava. (2021). Examining the Transformative Changes Introduced in Educational Assessment: Implications on Sustainable Development Goals in Higher Education. International Journal of Research and Innovation in Social Science (IJRISS Vol V. Issue VI June 2021 issn2454-6186
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40. Shava, GN., Heystek, J., & Chasara, T. (2021). Instructional Leadership: Its Role in Sustaining School Improvement in South African Schools, International Journal of Social Learning (IJSL), 1(2), 117-133. https://doi.org/10.47134/ijsl.vli2.51
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42. GN Shava and D. Nkengebeza (2020). Women in leadership positions, Experiences from Zimbabwe Higher Education. In Alava J. Auala R.K. Nkengebeza, D, Zulu, A and Abah, J.(ed) Innovation, and Educational Leadership, Management and Policy Shaping Educational Studies in the 21 Century (Educational Leadership and Policy Studies Vol1. Windhoek, Pollen Publishing, ISBN 978-99945-87-38-4
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44. GN Shava and D. Chasokela (2020). The Education Systems of Africa. Women in Higher Education Leadership and Parent hood. Experiences from a University in Zimbabwe. So Few Women in Leadership Positions. The Education Systems of Africa, Global Systems Book Chapter p1-15. Springer Publication http//doi.org/10.1007/978-3-03042-9-6-1
45. PI. Egwuasi, JM. Langudor., EK. Hussein ., OB Apen & GN Shava (2020). School Environment and Sustainable Development Goals Beyond 2030. Anchor House Publishing book chapter. 2020 6/7
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48. GN Shava &D Nkangbeza (2019). Distributed Leadership in Education ,Views and Perspectives. Educational Research Association Journal, V5.(4)

49. GN Shava &D Nkangbeza (2019). Qualitative research paradigm, a design for distance education researchers. The Namibia CPD Journal for Educators. Vol 5 (2019) 237-258
50. C. Ndebele. &. G. Shava (2019). A Socio Cultural Examination of Experiences and Challenges facing Women in School Leadership Positions from Rural School District in Zimbabwe, Journal of Gender Information and Development in Africa(JGDA) Vol. 8 Number2, August 2019.pp161-180. ISSN:2050-4284 Online
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55. FN. Tlou and Shava GN (2018). Alignment and Mismatches between Grade R Educators views of their own Practices and Curriculum Expectations in Mathematics Education: A reality check. Research output: International Journal of Progressive Research in Education Vol 2 No 1: 65-73
56. GN Shava. (2017). Leading school wide achievement: Integrating leadership models to enhance the performance of learners in South African Schools. Journal of Educational Studies.17(2) 183-203
57. GN. Shava (2016). Challenges and Opportunities Related to Achieving Quality Distance Education in Zimbabwe. Progresso, Vol No 38, (2): 33-46
58. G.N. Shava. (2016). Enhancing learner achievement through professional development. South African Journal of Higher Education Vol 30 (6):56-72
59. GN. Shava & C. Ndebele. (2016). Enhancing Learner Achievement through Effective School Leadership: Experiences from Selected Rural Schools in South Africa. International Journal of Education Sciences, 14(3):205-216

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