

Durban University of Technology

Department of Horticulture

COURSE CONTENT

NATIONAL DIPLOMA IN HORTICULTURE NDHRT2

HORTICULTURE I (HORT102)

1. Knowledge of the various fields of the green industry including relevant societies, allied trade associations and professional bodies is demonstrated.
2. Knowledge and skill of sexual plant propagation is demonstrated i.e. harvesting; germinating and transplanting seeds and spores.

Environmental factors are considered.

Equipment and facilities are used.

3. Knowledge and skills of asexual plant propagation are demonstrated in terms of the different types of cuttings; modified roots and stems; division; layering techniques; budding and grafting

Environmental factors are considered.

Equipment and facilities are used effectively.

Establishing techniques is applied.

Growing-on techniques are applied.

Environmental factors are considered.

Equipment and facilities are used effectively.

Mist propagation systems are investigated

Micro propagation techniques are identified

OUTCOMES

1. Outline the horticultural industry in terms of its different sectors within the green industry.
2. Demonstrate and apply plant propagation in terms of sexual Propagation.
3. Demonstrate and apply knowledge of asexual plant propagation.
4. Maintain newly propagated plant material.
5. Demonstrate effective use of controlled propagation environment

HORTICULTURE II (HORT202)

- 1 Nursery sitting, layout and the integration of components is examined.
- 2 Sitting, planning and construction techniques of growth structures (shade houses and greenhouses are discussed together with the appointment of specialist contractors as required.
- 3 Propagation facilities for cultivation and propagation are effectively and correctly planned / constructed, equipped and maintained.
- 4 The efficacy of optimal and effective orientation, the utilization of sunlight, ventilation, cooling and heating systems is emphasized.
- 5 Optimum Environmental conditions for plant growth viz Light, Oxygen, CO₂, Humidity and Water are discussed.

OUTCOMES

Plan, develop and maintain a propagation and cultivation facility.

HORTICULTURE III (HORT302)

- 1 International and local trends within the floriculture industry are investigated.
 - Economically viable crops are selected
 - Appropriate nursery facilities and structures are reviewed.
 - Production programs for selected crops are prepared
 - Appropriated cultural techniques are applied to achieve optimum yields.
 - Harvesting, preservation, storage, grading and packing processes are investigated.
 - Distribution and marketing techniques are reviewed
- 2 Economically viable annual crops are identified and selected.
 - Appropriate growth facilities and equipment are reviewed.
 - Production programs for selected crops are prepared.
 - Knowledge of seed storage, treatment and viability is demonstrated.
 - Correct seed sowing procedures are followed.
 - Appropriate media containers and seed sowing equipment are examined.
 - Relevant cultured techniques to achieve optimal germination are applied.
 - Culture practices including injection, nutritional monitoring and pest/disease preventions are reviewed.

Pinching, hardening off and staging techniques are examined.

Potting, distribution and marketing operations are investigated

3 Economically viable crops are identified

Appropriate growth facilities and structures are reviewed.

Production processes or selected crops are prepared for each plant category (indoor pot plants and foliage plants).

Appropriate cultural techniques are applied to achieve quality product lines including a knowledge of applied photoperiodic and thermo periodic techniques, use of growth regulators as applicable, fertilizer and irrigation regimes and pest and disease control.

Appropriate packaging, labeling, marketing and distribution strategies are evaluated.

Plant breeders' rights and selected royalties are examined.

4 Economically viable indigenous and exotic crops are identified.

Plant morphology, life cycle and physiology of significant crops are examined.

Appropriate propagation techniques are selected and applied.

Correct planting and cultural techniques including floral induction and forcing are examined.

Bulb production facilities and equipment are reviewed.

Packaging, distribution and marketing procedures are examined

5 Appropriate exotic and indigenous species are selected and their Horticultural significance described.

Seed harvesting, collection and cleaning procedures are examined.

Appropriate growth facilities are established.

Utilitarian uses of trees are discussed including amenity and conservation use, urban greening and the establishment of community nurseries.

6 Appropriate European and African medicinal and culinary herb species are selected and their uses and horticultural significance described

Propagation and cultural requirements for selected crops are described

Harvesting, packaging, distribution and marketing procedures are examined

OUTCOMES

- 1 Develop and maintain a cut flower farm.
- 2 Develop and maintain a seedling nursery.
- 3 Develop and maintain a wholesale container nursery.
- 4 Maintain a commercial bulb farm.
- 5 Develop and maintain a tree nursery for commercial, amenity or community requirements.
- 6 Develop and maintain a herb nursery for commercial, amenity or community requirements.

PLANT MATERIAL STUDIES I (PMAS101)

- 1 General External morphology of plants including physical structure of roots, stems, leaves, flowers, pollination and fertilisation, and fruit is described.
- 2 Descriptions of trees, shrubs, groundcovers, climbers, grasses annuals, aquatics, succulents, herbs, indoor plants, bulbs, vegetables and bedding plants are correctly demonstrated and applied in terms of morphology.
- 3 Diversity of plant types, habitats and their natural relationships; the identification and roles of Indigenous, exotic and endemic plants are described.
- 4 The horticultural significance, application and role of Plant taxonomy, plant nomenclature and classification is explained.
- 5 The various keys (books, cards, computer etc) are correctly used to identify plants.
- 6 Knowledge of plants listed in the National Plant List is acquired in terms of Plant types, habitats, relationships, appearance (form, growth habit, colour texture, seasonal and visual effects).
- 7 Plants are correctly used in terms of architectural, climatological and aesthetic functions.

OUTCOMES

- 1 Demonstrate knowledge of gross external plant morphology for identification and artificial classification of indigenous and exotic ornamental plants.
- 2 Demonstrate knowledge of plant taxonomy and nomenclature using identification keys as a tool for recognising diagnostic characteristics.
- 3 Identify ornamental plant material and describe their horticultural characteristics and application in the context of the nursery landscaping and conservation ambit.
- 4 Utilise plants functionally in terms of their architectural, growing requirements, climatological and aesthetic uses.

PLANT MATERIAL STUDIES II (PMAS201)

- 1 Internal Plant morphology including cytology (cell structure); histology (plant tissues) and anatomy is described.

- 2 Plant physiology and Metabolic processes including enzymes; water relations; mineral nutrition; photosynthesis and respiration are explained.
- 3 Various functional factors affecting plant selection including climatic and microclimate conditions; edaphic conditions and growing media; water requirements and environmental stresses are discussed.
- 4 Further Knowledge of plants listed in the National Plant List is acquired in terms of Plant types, habitats, relationships, appearance (form, growth habit, colour texture, seasonal and visual effects).

OUTCOMES

- 1 Acquire foundational knowledge of internal plant morphology and physiology.
- 2 Select and correctly utilise plants effectively in the environment in terms of their functional characteristics.
- 3 Identify ornamental plant material and describe their horticultural characteristics and application in the context of the nursery landscaping and conservation ambit

PLANT MATERIAL STUDIES III (PMAS301)

- 1 Diagnostic features pertaining to economically and horticulturally significant plant families are described.
- 2 Establishment –planting and transplanting procedures and maintenance techniques for the major categories of plant material viz groundcovers, shrubs and trees is explained.
- 3 Appropriate Arboricultural and tree care techniques including pruning, grafting, pollarding, topiary and hedging are described including the safe use of hand tools and machinery within the domestic, corporate and amenity context.

- 15 -

- 4 Further Knowledge of plants listed in the National Plant List is acquired in terms of Plant types, habitats, relationships, appearance (form, growth habit, colour texture, seasonal and visual effects)

OUTCOMES

- 1 Classify and arrange plant material according to their diagnostic characteristics to the level of family.
- 2 Describe planting, transplanting and maintenance techniques for the major categories of plant material.
- 3 Describe appropriate Arboricultural techniques for ornamental and indigenous trees and shrubs within the domestic, corporate and amenity context
- 4 Identify ornamental plant material and describe their horticultural characteristics and application in the context of the nursery landscaping and conservation ambit.

GROWTH MEDIA TECHNOLOGY (GMET101)

- 1 The efficacy of optimal and effective orientation, the utilization of sunlight, ventilation, cooling and heating systems is emphasized
- 2 Learner will acquire knowledge of controlled climatic environments including greenhouse and shade house facilities
- 3 The importance of soil as a growth medium within the green industry is described

Agricultural and horticultural uses of the medium are examined

- Modern potting media are introduced
- 4 Soil formation factors are described
 - The nature of Soil horizons, profiles and pedons is explained
 - The nature and significance of Soil texture and structure are examined
 - Soil triangles are introduced as an analytic tool for determining soil categories
 - Concepts of bulk density, permeability, air filled porosity, and water holding capacity are explained together with other key terminology
 - Agricultural practices and their impact on soil structure are examined
 - The management of soil temperatures are discussed together with the use of soil colour as a diagnostic tool.
 - 5 The effects of water stresses and excess on plant growth are examined
 - Concepts of capillarity and soil /water /plant relationships are discussed in full
 - The nature and importance of irrigation is examined
 - Sub surface and surface irrigation techniques are outlined together with Key factors such as frequency, duration and water quality and quantity.
 - 6 Soil life is described, classified and examined
 - The significance and nature of organic matter in the soil is discussed together with composting theory and the nature of C/N draw down
 - Soil colloids and clays are briefly described together with key concepts of cation exchange capacity and nutrient uptake
 - The significance of Soil pH and the deleterious effects of base and alkali soil extremes are examined
 - The effect, frequency and application of lime and sulphate additives is discussed
 - The nature, significance and remediation of saline and sodic soils is outlined
 - 7 Essential macro and micronutrients for plant growth are examined along with their precise role in plant growth. The diagnostic symptoms of the major deficiencies are described
 - Organic and inorganic forms of Nitrogen, Phosphorous and Potassium used in horticultural practice are defined.
 - The formulation of “complete” granular fertilizers, “straights”, slow release fertilisers, fluid fertilizers and trace element mixtures are described.
 - Elementary fertilizer calculations relevant to the industry are performed.
 - Fertiliser application methods and procedures for field and container media including pre-enrichment, fertigation, foliar sprays and top dressing are examined.
 - 8 The nature and individual characteristics, benefits and limitations of media components are described. Standard soil based and soil less media and formulations for container growth are surveyed.

Ordering, mixing, storage and handling procedures are discussed together with modern pasteurization and sterilization techniques.

Readings pertaining to soluble salt content (EC) and PH values are taken using appropriate instruments and the results applied to practical case studies.

The diverse range of containers available for nursery culture is examined and the cost, properties, benefits and limitations of each described.

OUTCOMES

- 1 Describe Environmental factors for optimum plant growth.
- 2 Acquire knowledge of Soils and media for use within the nursery or landscape context.
- 3 Describe the Origin, Development and Physical characteristics of soils.
- 4 Acquire knowledge of soil water, Drainage and irrigation.
- 5 Describe the nature and significance of soil life and organic matter.
- 6 Acquire knowledge of soil fertility, soil pH and salinity.
- 7 Describe the nature of plant nutrition and the use of fertilizers within the industry.
- 8 Select, develop and manage appropriate media for container growth

TURFGRASS CULTURE (TGCL101)

- 1 The role of grasses is evaluated in terms of civilization, sport, amenity and ecological rehabilitation.
- 2 Different turf grass species are identified in terms of their characteristics, function and morphology.
- 3 Turf grasses are selected according to their quality environmental tolerance and intended use.
- 4 Techniques to establish and maintain turf grasses are investigated in terms of establishment methods, site cultivation and maintenance practices.
- 5 Turf grass facilities are examined in terms of layout, use, knowledge of construction, reparation, irrigation systems and drainage.
- 6 Turf is maintained at optimal levels using a variety of controls including mowing practices, spring treatment, top-dressing and fertilization techniques
- 7 Alternative surfaces are identified (synthetic and biotic).
- 8 Social, cultural, economic and ecological influences on the turf grass industry are examined.
- 9 Indigenous veld grass applications and lawn substitutes are identified.
- 10 Current miscellaneous turf grass practices are identified – investigated including over seeding, interseeding, use of biostimulants, turf colouring and wetting agents.

OUTCOMES

- 1 Acquire knowledge of Establishing and maintaining quality turf grass for horticultural applications

SUPERVISORY MANAGEMENT I (SUMN101)

- 1 The habits for effective self management are described.
- 2 Personal time planning and management are demonstrated.
- 3 Business etiquette practices are reviewed.
- 4 The importance of clear communication skills is discussed and demonstrated for various business circumstances and applications.
- 5 Personal and professional ethics and social responsibility practices are explained.
- 6 The significance, function and role of management are defined, together with an understanding of various management responsibilities, skills and levels of management within a business organization

Organizational structures are outlined and departmentalization is reviewed for various public and private horticultural businesses

Organizational resources are reviewed such as people, financial and physical.

The scope of the business environment and the circumstances which affect a horticultural business is explained.

The principal management tasks of planning, leading, organizing and controlling are outlined.

- 7 Leadership styles and motivational techniques are examined;

Teamwork and team-building are reviewed for achieving management and organizational goals

Decision-making and problem-solving methods for managers are examined.

The process of imparting instructions to subordinates is clearly explained

The nature and significance of delegation as a management tool is emphasized together with appropriate control techniques

OUTCOMES

- 1 Acquire knowledge of personal management and professionalism practices expected within a green industries business.
- 2 Acquire knowledge of the generic nature and functions of management within the modern business environment.
- 3 Acquire knowledge of leadership and organizational skills for the effective supervision of staff.

HORTICULTURAL MANAGEMENT II (HMNT203)

- 1 Components, design and layouts of retail garden centres are described.

- 2 International and local retailing trends are discussed.
- 3 Practical merchandising and layout techniques are examined.
- 4 Personal selling techniques and quality service are explained.
- 5 Daily retail and office routines including handling cashiers, using Communication systems, record-keeping, stock taking and security is discussed.
- 6 Operational factors including procurement and dispatching techniques are described.
- 7 Business communication techniques are described especially business letters, telephone communication, faxes and e-mailing.
- 8 The marketing function is defined and the role of satisfying customers needs and determining target markets is explained

The relevance and nature of market research is demonstrated together with the development of feasibility and viability tests.

Marketing strategies are discussed in terms of developing an appropriate marketing mix (product, price, promotion and distribution) for various horticultural businesses

Maximising sales through promotions and displays are examined

The creation of effective promotional material and signage is demonstrated

- 9 Key financial terminology is explained

The establishment and maintenance of basic accounts and record-keeping is described

Using banks to run personal and business accounts

Profitable pricing and costing techniques are explained

OUTCOMES

- 1 Acquire knowledge of retail management techniques as applied to a retail garden centre.
- 2 Acquire knowledge of marketing theory and strategies for the horticultural Sector.
3. Develop appropriate financial literacy skills, both personally and for a small business such as a garden centre.

HORTICULTURAL PRODUCTION MANAGEMENT III (HPRM301)

- 1 Methods and procedures for planning, advertising, interviewing and selecting suitable applicants when staffing a horticultural SMME are examined.
- 2 The process and techniques for employee performance appraisals are discussed.
- 3 Strategies to foster Positive employer-employee relationships are explained.
- 4 The value and reasons for training and developing staff is explained
- 5 Office routines including record keeping relating to all staff is discussed

6 Relevant South African Labour Legislation including Labour Relations Act, Basic Conditions of Employment, Occupational Health and Safety Act, Unemployment Insurance Act and Skills Development Act is discussed

7 Employee compensation including determining wages, methods of remuneration and all legal aspects are examined

Disciplinary and grievance procedures are defined and applied.

The role and rights of trade unions and the CCMA are explained

Current factors affecting staffing and managing staff including AIDS safety in the workplace, and employment equity are discussed

Tendering practices for various horticultural business types are discussed

Current trends and policies such as BEE, outsourcing and contracting are described

8 Conflict-management and negotiating skills are developed

The law of contracts is explained

The business plan is to be presented using the following headings:

Product /Service description and need

Financial feasibility and viability studies

Market feasibility and viability studies

Marketing strategy and corporate identity

Operational and production considerations

Human Resource implications

Type of business registration, insurances and compliance with

SARS requirements

Credentials of presenter and CV

Appropriate Appendices including Cash flow, Income Statements and Balance sheets for a 3 year period.

OUTCOMES

- 1 Acquire knowledge of human resources management and labour relations.
- 2 Acquire knowledge of opportunities for sourcing work for a horticultural SMME.
- 3 Display leadership and management skills within the context of a middle-level manager and/or business owner.
- 4 Develop and present a workable business plan for use within the green industry. (Learners select appropriate business opportunities).

ENVIRONMENTAL STUDIES I (ESTD102)

- 1 The environmental significance of atmosphere (incl. climate), geology and hydrology within the biosphere is examined.

- 2 Biochemical cycles and their significance are explained.
- 3 Biotic components including man, plants and animals are reviewed in terms of community structure, succession and population dynamics.
- 4 Relevant Environmental Terminology is explained.

OUTCOMES

Acquire knowledge of the physical and biotic components of the natural environment.

ENVIRONMENTAL STUDIES II (ESTD201)

- 1 The impact of the human imprint on the environment (political, socio and economic) is analysed
- 2 Anthropogenic impacts on the environment resulting in habitat destruction and degradation through unsustainable land use practices are reviewed.
- 3 The causes and significance of the following phenomena are outlined. These include inter alia:
 - Global warming and ozone depletion,
 - Acid rain,
 - Atmospheric, terrestrial, marine and aquatic pollution,
 - Desertification, Deforestation,
 - Poverty and its alleviation,
 - Genetically Modified Organisms (GMOs).
- 4 The significance, benefits, limitations and practices of ex situ and in situ conservation techniques are explored.
- 5 Land reclamation practices including rehabilitation and re vegetation procedures are described.
- 6 Categories and examples of protected sites are identified.
- 7 First and Third world conservation approaches are contrasted and debated.
- 8 The significance of and nature of biodiversity and species loss is examined.
- 9 Sustainable open space planning, policies and practice for cities are examined.
- 9 The significance and implementation of Local Agenda 21 strategies are discussed.
- 10 Sustainable development strategies that balance economic development with environmental responsibilities are examined by means of relevant case studies.
- 11 The nature and significance of Environmental Impact Assessments (EIA's) is explained as well as the use of Integrated Environmental Management (IEM) is introduced as a planning and monitoring tool.
- 12 International treaties and conventions are outlined.
- 13 South African Environmental law and its impact and relevance to environmental managers are examined.

OUTCOMES

The learner will be able to explain the significance of environmental issues within the local context of the private and public horticultural sectors (Scientific Knowledge).

PLANT PROTECTION II (PLPR201)

- 1 Internal Plant morphology including cytology (cell structure) ; histology (plant tissues) and anatomy is described.
- 2 Plant physiology and Metabolic processes including enzymes; water relations; mineral nutrition; photosynthesis and respiration are explained.
- 3 Various functional factors affecting plant selection including climatic and microclimate conditions; edaphic conditions and growing media; water requirements and environmental stresses are discussed.
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OUTCOMES

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HORTICULTURAL MECHANISATION I (HMEC101)

- 1 Workshop Tools inter alia: spanners; power tools are examined.
- 2 Mechanised equipment such as tractors and appropriate tractor drawn machinery inter alia: gang, rotary and hydraulic mowers, fertilizer spreaders, seed sowers, boom and other sprayers, hollow tinners and verticutters are examined.
- 3 The Selection of appropriate task specific mowing equipment including hand and self propelled mowers, ride on mowers and brush cutters is emphasized.
- 4 Safety aspects including an understanding of OHSAS 18001 criteria is emphasized.

OUTCOMES

- 1 Acquire knowledge of the various workshop tool and mechanized equipment.
- 2 Acquire knowledge on the appropriate application for the various tools and machinery.
- 3 Acquire knowledge on the safe handling and operation of the various tools and machinery.

SITE PLANNING I (SPLN101)

- 1 The exact nature, context and relevance of site planning and landscaping is established.
- 2 The landscaping procedure of survey, analysis, synthesis, design, implementation and maintenance is outlined.
- 3 Design vocabulary and hard and soft landscaping components are described
- 4 Functional and aesthetic considerations are examined.
- 5 Client and User needs are discussed for various project-types placing emphasis on the client brief and user surveys

Broad legislative requirements are outlined

Physical site data such as soil, geology, topography, vegetation, climate and wildlife is reviewed

Manmade and cultural elements are outlined

Various specialist consultants are identified and located

Record keeping techniques for data is examined

- 6 Plan graphic techniques such as scale, page layout, labelling, symbols and dimensions are integrated and demonstrated

Basic soft landscaping elements are quantified using various plan measuring techniques and mathematical calculations.

Basic on-site measuring and levelling techniques and equipment are demonstrated.

OUTCOMES

- 1 Acquire knowledge of broad principles that need to be achieved to ensure a site is planned successfully.
- 2 Acquire knowledge of data to be collected and analyzed for planning a site.

BACHELOR OF TECHNOLOGY: HORTICULTURE BTHRT1

RESEARCH METHODOLOGY (RSMT101)

- 1 Determine the criteria for good research.
- 2 Prepare a Problem Statement.
- 3 Identify the Variables.
- 4 Justify the reason for the study.
- 5 Define the terms.
- 6 Construct a hypothesis.
- 7 Discuss Qualitative and Quantitative research.

- 8 Discuss other forms of research they may use at a later date.
- 9 Understand the basics underlying ethical research.
- 10 Do a literature search.
- 11 Reference work correctly.
- 12 Collect and analyze data.
- 13 Construct a data capture tool (questionnaire).
- 14 Write a proposal.
- 15 Discuss Reliability and Validity.
- 16 Sample populations.
- 17 Develop a critical approach to their research.

OUTCOMES

- 1 To equip the Bachelors in Technology student with the generic tools for research.
- 2 To construct a research proposal that incorporates a pilot study, and
- 3 To present the results of the research in a publishable paper.

HORTICULTURAL PRODUCTION MANAGEMENT IV (HPRM401)

- 1 The relevance and application of Project management in a Horticultural environment is examined.
- 2 The relevance and application of Management Information Systems in a Horticultural environment is examined.
- 3 The relevance and application of Organisational Structure and Behaviour in a Horticultural environment is examined.
- 4 Environmental aspects or Systems influencing the Green Industry are explained. The following are examined: Macro and micro economical environmental systems; technological; international; social; legal and political and ecological.
- 5 The importance of mentoring is examined.
- 6 The management of consultants is explained.
- 7 Basic horticultural calculations are explored interalia: stock solutions for fertigation; chemical concentrations for pest control; water delivery and water quality specifications.
- 8 Productivity issues relating to capital, labour and equipment is examined..
- 9 The financial administration aspects of Production Horticultural Management operations are examined. There are: Income statement, balance sheet; financial ratios; cash-flow; budgets; working capital; margins; costing and crop profitability; creditor and debtor management and business plans.

OUTCOMES

- 1 The learner will be able to apply the methods of project management and management information systems.
- 2 The learner will appreciate the environmental aspects affecting managers in the Green Industry.
- 3 The learner will be able to compile and execute a comprehensive business plan in spreadsheet software.

HORTICULTURAL PRODUCTION TECHNIQUES IV (HPTC401)

- 1 Transmission of traits is examined (Genetics).
- 2 The exploitation of this knowledge is explained (Plant Breeding).
- 3 Micro-propagation (tissue culture) techniques are explained and their applicability in the Horticultural industry outlined.
- 4 Hydroculture (hydroponic) techniques are investigated and their applicability in the Horticultural industry explained.
- 5 Applied aspects of Intensive Plant Production Techniques are explained.

OUTCOMES

Develop a greater understanding of aspects of Horticultural Production Techniques