

**1. Module details****Module name****Digital Versatile Disc (Video) Principles****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

**Module code**

NUE906

**Discipline code**

0703230

**2. Module purpose**

The purpose of this module is to provide students with an understanding of digital video encoding and decoding. In addition the module will provide students with the knowledge and skills to perform appropriate service adjustments and demonstrate the operation of a DVD player.

**3. Prerequisites**

NUE101 Introduction to Television.  
NE99 Compact Discs Principles and Servicing.

**4. Relationship to competency standards**

This module provides some of the knowledge and skills underpinning competence in the following standards: Metals and Engineering Industry National Competency Standards, Units 18.45A, 18.56A, 18.65A. National Electrotechnology Industry Standards, Units NES205, NES302, NES303, NES305, NES306, NES402, NES403, NES406, NES407.

**5. Content****DVD overview**

Disc drive unit  
Disc type and capacity  
Standard functions of a DVD player

**Compression systems**

principles of MPEG digital video processing  
MPEG standards  
reasons for data compression  
MPEG2 profiles  
Hybrid encoding with three technologies: spatial axis compression-discreet cosine transform; time base competition; predictive encoding motion compensation; image compression by predictive encoding for predicting motion from neighbouring frames  
Time base competition  
Sequence  
Bi-directional prediction: I,P and B picture sequence  
Hoffman encoding: 4:2:0 encoding  
Data compression: CD ROM (MPEG 1 & 4); DVD video; DVD ROM  
DVD video image quality - variable transfer rate: high image recording efficiency

DVD video sound: 5.1 channel surround sound; Dolby AC3 encoding system; linear PCM

**Other DVD features**

Multiple language: feature; dubbing; subtitles

Stream and packet transmission: stream - data flow; packet multiplex transmission system

DVD video interactive features: title menu; DVD menu; multi story; multi angle; multiple aspect ratio; seamless playback; parental control

**DVD video copyright protection system**

Reproduction control: regional codes

Copy protection

**DVD video software production**

Disc manufacture (overview)

**DVD ROM and other standards**

**Block diagram of a DVD player**

RF block

Data processor

Decryption

Buffer control

Video decoder

Letter box conversion

Video equaliser and noise reduction

Sub picture

PAL encoder

On screen display

Audio detector

Audio decoder

Clock generation system control

Interface control

Laser operation principles

**Service adjustments**

Set up, connection and operation of a DVD player

## 6. Assessment strategy

### Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

### Conditions of assessment

Normally learning and assessment will take place in a classroom / laboratory environment.

## 7. Learning outcome details

### Learning outcome 1

**Describe the operational principles and standards of digital signal processing as utilised in DVD systems.**

### Assessment criteria

- 1.1 State the advantages and disadvantages of digital and analogue signal processing of a video signal.
- 1.2 Describe the following principles of MPEG video compression:
  - spatial axis compression
  - time base compression
  - Hoffman encoding
  - variable transfer rate.
- 1.3 Describe the purpose of stream and packet multiplexing.
- 1.4 Describe the sound systems employed in DVD.
- 1.5 Identify artefacts in a digitally processed signal.
- 1.6 List relevant standards of a digitally processed signal.
- 1.7 List relevant standards of a digitally processed video signal.

**Learning outcome 2**

**Describe the standards and features of DVD players.**

**Assessment criteria**

- 2.1 List relevant standards for DVD players.
- 2.2 Describe the reasons for and list the six world divisions for DVD.
- 2.3 Define pan and scan, and letterbox mode.
- 2.4 Describe other features such as multiple language, sub title, etc. used in DVD.
- 2.5 List and describe the DVD interactive features.

**Learning outcome 3**

**Describe the operation of DVD players.**

**Assessment criteria**

- 3.1 Draw the simplified block diagram of a DVD player identifying the function or purpose of each block.
- 3.2 Draw the directions of signal flow on the block diagram.
- 3.3 Identify major functional blocks given the schematic of a DVD player.
- 3.4 Identify major physical components given a schematic and a DVD player.

**Learning outcome 4**

**Demonstrate the operation and adjustment of DVD players.**

**Assessment criteria**

- 4.1 Connect and operate a DVD player.
- 4.2 Select DVD service mode and step through the tests and adjustments.
- 4.3 Measure waveforms (where appropriate) when a DVD player is processing a relevant test disc.
- 4.4 Make service adjustments in the signal path (where appropriate) in accordance with the service manual.

**8. Delivery of the module**

**Delivery strategy**

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective way to achieve this is by the integration of theory and practice where students learn by experimentation and through research and laboratory reports. It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning outcome sequence other than that indicated in the module.

**Resource requirements**

Resources should be sufficient for students to carry out experiments on an individual basis. This will require a demonstration DVD player and test equipment.

Useful references include manufacturers' product manuals and:

Beroit H, *Digital TV*  
Arnold London 1997

Laufer A, *Principles of Digital Audio & Video*  
Artech House Boston 1997

**Occupational health and safety requirements**

A safe and healthy environment will be provided for students and teachers as well as safe procedures with regard to learning / teaching activities.