The Hashemite University
Faculty of Allied Health Sciences
Department of Medical Imaging
Course Syllabus

Course information

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Digital Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Code</td>
<td>110508342</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>110508211</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
</tbody>
</table>

Course Description

This course forms an introduction into the principles of computed and digital radiography and their applications in the field of medical imaging. The advantages and disadvantages of digital over screen-film radiography will also be covered in this course. Furthermore, this course provides an insight and an understanding of different digital-based imaging modalities such as: digital fluoroscopy, digital mammography, computed tomography and magnetic resonance imaging and their clinical applications. In addition, this course covers the different digital image pre-processing and post-processing techniques used to improve the interpretation of different medical images.

Course Objectives

By the end of this course, student is expected to:

- Be able to understand the physical principles of digital imaging acquisition, processing, display, storage and communication.
- Be able to understand the differences between screen-film and digital radiography.
- Be able to understand the basic principles of image processing techniques.
- Be able to understand the different types of digital-based imaging modalities

Recommended Textbook

<table>
<thead>
<tr>
<th>Title</th>
<th>Digital Radiography: An introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Euclid Seeram</td>
</tr>
<tr>
<td>Publisher</td>
<td>Delmar, Cengage Learning</td>
</tr>
<tr>
<td>Year</td>
<td>2011</td>
</tr>
<tr>
<td>Edition</td>
<td>First</td>
</tr>
<tr>
<td>Book website</td>
<td><a href="http://www.cengagebrain.co.uk/shop/search/9781401889999">http://www.cengagebrain.co.uk/shop/search/9781401889999</a></td>
</tr>
</tbody>
</table>

Other References

<table>
<thead>
<tr>
<th>Title</th>
<th>digital radiography and PACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Christi Carter, Beth Veale</td>
</tr>
<tr>
<td>Publisher</td>
<td>Mosby/Elsevier</td>
</tr>
<tr>
<td>Year</td>
<td>2010</td>
</tr>
<tr>
<td>Edition</td>
<td>First</td>
</tr>
</tbody>
</table>

Course Contents

- Introduction
- Digital image processing concepts
- Computed Radiography
- Digital Radiography (Indirect and direct DR)
- Digital Fluoroscopy
- Digital Mammography
- Computed Tomography
- Magnetic Resonance Imaging
- Image post-processing and analysis

Assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Second Exam</td>
<td>20%</td>
</tr>
<tr>
<td>In course assessment</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
</tr>
</tbody>
</table>
Digital Radiography. The concept of moving images digitally was introduced by Albert Jutras in Canada during his experimentation with
teleradiology (moving images via telephone lines to and from remote locations) in the 1950s. Early PACSs were developed by the U.S.
military in an effort to move images among Veterans Administration (VA) hospitals and to send battlefield images to established
hospitals. Digital radiography is the latest advancement in dental imaging and is slowly being adopted by the dental profession. Digital
imaging incorporates computer technology in the capture, display, enhancement, and storage of direct radiographic images. Digital
imaging offers some distinct advantages over film, but like any emerging technology, it presents new and different challenges for the
practitioner to overcome. This article presents an overview of digital imaging including basic terminology and comparisons with film-
based imaging. The principles of direct and indirect digital imaging modaliti Digital radiography | Radiology Key Digital Radiology: An
Introduction for Technologists by Euclid Seeram is used for courses in radiographic imaging procedures, production, and exposure. This
book will be a supplemental reading book in the Radiographic Imaging course and will specifically supplement Carlton/Principles of
Seeram is used for courses in radiographic imaging procedures, production, and exposure. This book will be a supplemental reading
book Digital radiography is a form of radiography that uses x-ray-sensitive plates to directly capture data during the patient
examination, immediately transferring it to a computer system without the use of an intermediate cassette. Advantages include time
efficiency through bypassing chemical processing and the ability to digitally transfer and enhance images. Also, less radiation can be
used to produce an image of similar contrast to conventional radiography. While digital radiography offers definite advantages, it might
not be the most appropriate choice at this time for many clinical facilities because of cost and other operational considerations such
required equipment or professional skills of the staff. Frequently asked questions by the health professionals. » Do I need a darkroom
when I buy a digital X-ray system? » Do I have to throw away my old X-ray equipment when I move to digital imaging? » Do I have to
be a computer expert to use digital imaging? » Do I need to have special training to interpret digital X-rays? » The salesman says CR is
Chapter 1 Introduction to Digital Radiography and PACS

Objectives

1. Define the term digital imaging.

15 Digital Radiography

Cassetteless system

Uses a flat panel detector or charge-coupled device (CCD) hard-wired to computer

Requires new installation of room or retrofit

Elsevier items and derived items © 2008 by Mosby, Inc., an affiliate of Elsevier Inc.

16 Digital Radiography

Two types of digital radiography

Indirect capture

DR Machine absorbs x-rays and converts them to light.

CCD or thin-film transistor (TFT) converts light to electric signals.

While digital radiography offers definite advantages, it might not be the most appropriate choice at this time for many clinical facilities because of cost and other operational considerations such required equipment or professional skills of the staff.

Frequently asked questions by the health professionals:

» Do I need a darkroom when I buy a digital X-ray system?

» Do I have to throw away my old X-ray equipment when I move to digital imaging?

» Do I have to be a computer expert to use digital imaging?

» Do I need to have special training to interpret digital X-rays?

» The salesman says CR is better than DR? What do these terms mean, and is this true?

» Can I perform angiographic procedures with a digital radiography X-ray unit?

Digital radiography, also known as direct digital radiography, uses x-ray-sensitive plates that directly capture data during the patient examination, immediately transferring it to a computer system without the use of an intermediate cassette as is the case with CR.

Commonly referred to as plates, these flat panel detectors use a combination of amorphous silicon detectors with cesium or gadolinium scintillators that convert X-ray to light which is ultimately translated by thin film transistors into digital data (Fig. 2-38).

This technology is significantly more expensive than CR technology, but the images are of the highest quality and are seamlessly sent to a computer display.

Digital radiography is the latest advancement in dental imaging and is slowly being adopted by the dental profession. Digital imaging incorporates computer technology in the capture, display, enhancement, and storage of direct radiographic images. Digital imaging offers some distinct advantages over film, but like any emerging technology, it presents new and different challenges for the practitioner to overcome. This article presents an overview of digital imaging including basic terminology and comparisons with film-based imaging.

The principles of direct and indirect digital imaging modalities, intraoral and extraoral applications, image processing, and diagnostic efficacy will be discussed.

Digital Radiography

The concept of moving images digitally was introduced by Albert Jutras in Canada during his experimentation with teleradiology (moving images via telephone lines to and from remote locations) in the 1950s.

Early PACSs were developed by the U.S. military in an effort to move images among Veterans Administration (VA) hospitals and to send battlefield images to established hospitals.