

Course Specification of Computer Applications in Radiology

Faculty: Medicine and Health Sciences

Department: Health Sciences

Program: Bachelor in Radiologic Technology & Medical Imaging

| I. General information about the course instructor : | | | | | | | |
|--|------------------------|-------------------------------|-----|-----|-----|-----|-----|
| Name | Dr. Awadh Ali Alqubati | Office Hours(3 Hours Weekly) | | | | | |
| Location & phone number | Al-Asbahi -7٧٠٨٠٧٢٩٥ | Sat | Sun | Mon | Tue | Wed | Thu |
| Email | dawadh@gmail.com | | | √ | | | |

| II. General information about the course: | | | | | | |
|---|---|---|------------------|-----------|----------|-------|
| 1. | Course Title : | Computer Applications in Radiology | | | | |
| 2. | Course Code and Number : | BMI314 | | | | |
| 3. | Credit Hours : | Credit Hours | | | | Total |
| | | Theoretical | Seminar/Tutorial | Practical | Training | |
| | | 2 | 0 | 0 | 0 | |
| 4. | Study Level and Semester: | 3 rd Year / 1 st semester | | | | |
| 5. | Pre-requisites: | BUST09 | | | | |
| 6. | Co-requisites: | None | | | | |
| 7. | Program in which the course is offered: | Bachelor in Radiologic Technology & Medical Imaging | | | | |
| 8. | Teaching Language: | English | | | | |
| 9. | Instruction location: | University of Science and Technology, Sana'a, Yemen | | | | |

| III. Course Description |
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| <p>This course is designed for students with background in computer and electronic science. It will provide basic concepts in radiologic systems with their components, networking communications, and application in radiology to understand the procedure of medical image acquisition and manipulate the digital information's in the form of images and text data by special programs and systems. The teaching strategies of this course include lectures, group discussion, self-learning, brainstorming, problems solving, and assignments. The assessment strategies include written exams, and assignment evaluation. Computer Skills is a pre-request course.</p> |

عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبدالحبيب القباطي

الموافق
1٥/٩

المراجع:
د. عبدالله ظاهر

الموصف:
د. عوض علي القباطي

IV. Course Aims: This course aimed to

1. Provide the students basic knowledge of computer components, construction and computers applications in radiology.
2. Learn the student the construction of a computed radiology and digital imaging.
3. **Assist student** to explain the picture archival and the communication system (PACS) procedures.
4. Enable the student to use DICOM in medical imaging and health care information systems.
5. Provide the students the skills to interpret the process of recording, reading, manipulating, and erasing of medical image.

V. Course Intended Learning Outcomes (CILOs) :

1. Explain the principles of digital radiography (DR), computed radiography (CR), and picture archival and communication system (PACS).
2. Describe the construction and processing of digital imaging.
3. Interpret the role of technical factors, equipment selection, exposure indicators, and software components in medical image reconstruction.
4. : Evaluate the effectiveness of computed tomography, digital imaging and PACS system in health care enhancement.
5. Implement the technical principles to improve the understanding of radiologic equipment work.
6. Assess medical imaging and PACS procedures to provide high quality diagnostic image.
7. Manage with health team members to enhance the radiologic images.
8. Assess employed programs in performing and developing radiologic systems.
9. Prepare practical reports in precise details about computed radiologic applications.



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VI. Course topics and sub-topics (theoretical and practical) with contact hours and alignment to CILOs

Topics/Units of Course Contents

Theoretical Aspects

| No. | Course Topics/Units | Sub-topics | Week due | Contact Hours |
|-----|--|---|-----------------------------------|---------------|
| 1 | Introduction to Digital Radiography | <ul style="list-style-type: none"> Digital Radiography Development of Digital Radiography Computed Radiography Comparison of CR and DR with Conventional Radiography | 1 st | 2 |
| 2 | Basic Computer Principles | <ul style="list-style-type: none"> Computer principles Hardware Components Monitors Operating Systems Computers in Medical Imaging. | 2 nd | 2 |
| 3 | Computed Radiography | <ul style="list-style-type: none"> Computed Radiography Equipment Imaging Plate Imaging Plate Artifacts The Reader Components and Operation of Computers Computer Software Storage and Transfer of Data in Computers Analog Data and Conversion between Analog and Digital Forms Storage, Processing, and Display of Digital Images. | 3 rd , 4 th | 4 |
| 4 | Image Acquisition | <ul style="list-style-type: none"> Computed Radiography Image Acquisition Exposure Flat-Panel Detectors Complementary Metal Oxide Silicon Detective Quantum Efficiency Detector Size Spatial Resolution Pixel Size and Matrix Size Technical Factor and Equipment Selection Cassetteless Image Acquisition Errors. | 5 th , 6 th | 4 |
| 5 | Digital Radiographic Image Processing and Manipulation | <ul style="list-style-type: none"> Digital Radiographic Image Processing and Manipulation Reader Functions CR Image Sampling Digital Radiography Image Sampling Modulation Transfer Function Quality Control Workstation Functions Basic Functions of the Processing | 7 th , 8 th | 4 |

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|--|---|---|--|-----------|
| | | System <ul style="list-style-type: none"> • Two- dimensional , and Three- dimensional image reconstruction. | | |
| 6 | Mid Term exam | Mid Term exam | 9 th | 2 |
| 7 | Image management | <ul style="list-style-type: none"> • Data processing • Reconstruction • Archiving • Communication Systems • Digital Imaging and Communications in Medicine (DICOM). • Teleradiology | 10 th | 2 |
| 8 | Picture archival and communication systems (PACS) | <ul style="list-style-type: none"> • Fundamentals • Image Acquisition • Display Workstations • Archiving Components • Archive Servers • Archive Considerations • Workflow • System Architecture • Client/Server-Based Systems • Distributed Systems • Web-Based Systems • Radiologist Reading Stations • Physician Review Stations • Technologist QC Stations • File Room/Image Management Stations • Advanced Workstation Functions. | 11 th , 12 th | 4 |
| 9 | Networking and Communication Basics | <ul style="list-style-type: none"> • Network Classifications • Typical Components of a Network • Network Topology • Application Interfacing • Personal area network (PAN). • Local area network (LAN). • Metropolitan area network (MAN). • Wide area network (WAN). • Global Area Network (GAN) | 13 th | 2 |
| 10 | Advanced Computer Applications | <ul style="list-style-type: none"> • Three-dimensional Imaging • Radiation Therapy Planning • Simulation & . Design | 14 th , 15 th | 4 |
| 11 | Final Exam | Final Exam | 16 th | 2 |
| Total number of weeks and hours | | | 16 | 32 |



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