

**Discipline MCP5840**   
**Informatics Applied to Medical Images**

**Concentration area:** 5131

**Creation:** 19/09/2019

**Activation:** 19/09/2019

**Credits:** 2

**Workload:**

Theory (weekly)	Practice (weekly)	Study (weekly)	Duration	Total
2	0	3	6 weeks	30 hours

**Professors:**

Marco Antonio Gutierrez

Sérgio Shiguemi Furuie

**Objectives:**

**OBJECTIVE:** This course aims to provide fundamental information and concepts on integrated access to medical imaging, existing standards and the application of computerized imaging in Cardiology. The models and physical principles of imaging of the main modalities in Cardiology, namely, X-ray, Tomography, Magnetic Resonance, Ultrasound, Optical Coherence Tomography (OCT) and Nuclear Medicine, will be addressed. The basic principles in digital image processing, such as discretization, contrast, filtering, compression, tomography and quantification will also be covered. Modern concepts of integrating clinical information with images will also be developed, especially PACS (Picture Archiving and Communication Systems).

**Rationale:**

**RATIONALE:** With the sophistication of diagnostic and therapeutic methods, it is possible to notice the increasing presence of medical equipment involving images. A better understanding of the limitations and potentialities of medical imaging equipment as well as processing techniques are therefore important for better use of the data. Another important aspect is the awareness of the effect of parameters involved in digital processing, such as filter type, cutoff frequency, etc., which can substantially alter the result and, consequently, the diagnosis.

**Content:**

**CONTENT:**

Introduction: Course Overview; Evaluation criteria; Digital images: basic concepts on resolution, quantization, contrast, digital filters; Medical imaging: physical principles and models; PACS: Picture Archiving and Communication Systems; Basic concepts; Image compression; Visualization techniques; Integration of medical information; Information volume: transmission and storage; PACS modeling; Multi-modal studies; X-ray and Tomography: Physical principles of image formation; Tomographic Reconstruction; Clinical Applications Ultrasound: Physical principles of image formation; Clinical Applications Nuclear

Medicine: Physical principles of image formation; Clinical Applications  
Magnetic Resonance: Physical principles of image formation; Clinical Applications  
Optical Coherence Tomography: Physical Principles of Image Formation; Clinical Applications

**Type of Assessment:**

EVALUATION: The evaluation of the students of this discipline will be made based on individual work.

**Notes/Remarks:**

NOTE: Minimum number of students: 05 Maximum number of students: 25

**Bibliography:**

H K Huang. PACS and Imaging Informatics: Basic Principles and Applications. Wiley-Liss Inc, 2nd Edition, 2004 (ISBN-10: 0471251232, ISBN-13: 978-0471251231); R C Gonzalez, R E Woods. Processamento de Imagens Digitais. Edgard Blucher Ltda, 1a. Edição, 2000 (ISBN: 8521202644, ISBN-13: 9788521202646); S.Webb (Editor) The Physics of Medical Imaging. Institute of Physics Publishing, Bristol, 1st. Edition 1988, (ISBN-10: 0852743491, ISBN-13: 978-0852743492); Handbook of Medical Imaging, Volume 1, Physics and Psychophysics. J Beutel, H L Kundel, R L van Metter (Eds) . SPIE Publications, 2nd Edition, 2009 (ISBN-10: 0819477729, ISBN-13: 978-0819477729); Handbook of Medical Imaging, Volume 2, Medical Image Processing and Analysis. M Sonka, J M Fitzpatrick (Eds). SPIE-The International Society for Optical Engineering, 2000 (ISBN-10: 0-8194-36224, ISBN-13: 978-08194-36221); V V Tuchin, Tissue Optics – Light Scattering Methods and Instruments for Medical Diagnosis, V Tuchin 2nd Edition, 2007 (ISBN-10: 0-8194-6433-3, ISBN-13: 978-08194-6433-0).