Discipline MCP5840
Informatics Applied to Medical Images

Concentration area: 5131

Creation: 20/01/2022

Activation: 20/01/2022

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:

In this discipline, the objective is to provide fundamental information and concepts about the integrated access to medical images, existing standards and the application of informatics in image processing in Cardiology. The models and physical principles of imaging of the main modalities in Cardiology will be addressed, namely, X-Ray, Tomography, Magnetic Resonance, Ultrasound, Optical Coherence Tomography (OCT) and Nuclear Medicine, in addition to providing basic knowledge in processing digital imaging, such as discretization, contrast, filtering, compression, tomography and quantification. Modern concepts of integrating clinical information with images will also be developed, in particular PACS (Picture Archiving and Communication Systems).

Rationale:

With the sophistication of diagnostic and therapeutic methods, there is a growing presence of medical equipment involving images. A better understanding of the limitations and potential of medical image generating equipment, as well as the processing techniques, are therefore important for a better use of data. Another important aspect is awareness of the effect of parameters involved in digital processing, such as, for example, type of filters, cutoff frequency, which can substantially alter the result and, consequently, the diagnosis.

Content:

Introduction: Course Overview; Rating criteria; Digital images: basics about resolution, quantization, contrast, digital filters. Medical imaging formation: 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. 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:

The evaluation in this discipline will be based on individual work.

Notes/Remarks:

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. Edition1988, (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 Scteering Methods and Instruments for Medical Diagnosis, V Tuchin2nd Edition, 2007 (ISBN-10: 0-8194-6433-3, ISBN-13: 978-08194-6433-0).

Class type:

Não-Presencial

Additional class type information:

- **A porcentagem da disciplina que ocorrerá no sistema não presencial (1-100%).** A disciplina MCP5840 será 100% não presencial.
- **Detalhamento das atividades que serão presenciais e das que serão desenvolvidas via remota, com discriminação do tempo de atividade contínua online.** Atividades desenvolvidas remotamente: Discussão sobre os temas elencados na ementa, após apresentação pelo ministrante da disciplina.
- **Especificação se as aulas, quando online, serão síncronas ou assíncronas.** As aulas online serão síncronas.
- **Descrição do tipo de material e/ou conteúdo que será disponibilizado para o aluno e a A plataforma que será utilizada.** Todo o conteúdo das aulas já se encontra depositado no e-Aulas e e-Disciplinas desde as últimas 2 edições da disciplina MCP5840
- **Definição sobre a presença na Universidade e, quando necessária, discriminar quem deverá estar presente (professora/professor; aluna/aluno; ambos).** Professor
- **Descrição dos tipos e da frequência de interação entre aluna/aluno e professora/professor (somente durante as aulas; fora do período das aulas; horários; por chat/e-mail/fóruns ou outro).** Durante as aulas e por Email
- **A forma de controle da frequência nas aulas.** Chamada oral e controle do registro pelo Chat
- **Informação sobre a obrigatoriedade ou não de disponibilidade de câmera e áudio (microfone) por parte dos alunos.** Obrigatória a disponibilidade de câmera e microfone por parte do aluno, além de conexão Internet banda-larga.
- **A forma de avaliação da aprendizagem (presencial/remota).** Avaliação de trabalho manuscrito entregue individualmente pelo aluno, com detalhamento do conteúdo de cada uma das aulas.