POSTGRADUATE PROGRAM
"Information Technologies in Medicine and Biology"

Courses Contents

The code of each course indicates the category, the relevant direction and the ascending order, ie:
Υπ=Required, Επ=Elective, I=Medical Informatics track, B=Bioinformatics track

ΥΠ1 - Biology - Physiology

Code: ΥΠ1
Course Title: Biology - Physiology
Semester: 1st
Category: REQUIRED
Lecture hours: 3
Instructor: Karali (BRFAA), Anastasiadou (BRFAA)

Course web page: http://eclass.di.uoa.gr/courses/D437/

Course Description:

The course aims to provide a comprehensive introduction to the development, differentiation, reproduction and functioning of the structural unit of living beings, the cell. Emphasis will be placed on the transfer of genetic information, its relationship to normal cell function and the importance of its disturbance in the process of pathogenesis. The organization of cell in systems and the ways systems communicate will help in the understanding of the importance of the networks created in the body for normal functioning. The analysis of the functioning rules of the systems will explain the contribution of systems modelling to the understanding of the pathogenesis process and to designing therapeutic approaches. The reference to the principles of genetics and issues relating to the detection of genetic information will raise the social dimension of the current research activity including bioinformatics.
The basic biological unit: the cell (organization of cells. cytoskeleton, cell organelles, structure and function, biofilms, receptors). Structural components of the cell: proteins (structure, function, regulation, analysis, predicition). Cell division - Cell cycle. Cellular communication (biochemical / molecular organization of communication between different functions, examples of disruption to the smooth interaction). Genetic Information: DNA (Deoxyrivonucleic acids, genes, chromosomes, genomes). From DNA, to RNA, to the synthesis of proteins. Genetic Code (Transcription, Translation, Analysis and organization of sequences). Genetic engineering: . Sequences-homology - families – protein interactions. Enzymes. Recombinant proteins (antibodies - vaccines). From cell to systems (Principles of organization and operation of systems). Organisation of specific systems, such as cardiovascular and endocrine, focusing on mechanisms of synergy, e.g. signal transduction pathways. Physiology of the Nervous System (principles of cellular and molecular neurobiology and examples of functions such as learning and memory) differentiation (stem cells, cell types, tissues, cell therapies). Evolution (phylogenetic trees). Principles of human genetics. Molecular basis of disease (Pathogenesis of common diseases such as cancer, diabetes).

ΥΠ2 - Pattern Recognition

Code: ΥΠ2
Course Title: Pattern Recognition
Semester: 1st
Category: REQUIRED
Lecture hours: 3
Instructor: Perantonis (Demokritos)

Course web page: http://eclass.di.uoa.gr/courses/D449/

Course Description:

Classification based on Bayes decision theory (basic principles; Bayes classifiers for normal distributions; estimation of probability density: maximum likelihood estimation, maximum a posteriori probability, maximum entropy). Bayesian networks. Linear classifiers (single layer perceptron, LMS algorithm, support vector machines). Non-linear classifiers (decision trees, multilayer perceptrons, radial basis functions, non-linear support vector machines). Context based classification (Markovian chains, Viterbi algorithm, hidden Markov models). Introduction to feature selection and extraction (statistical hypothesis testing, search methods, principal component analysis, linear discriminant analysis, moments, discrete Fourier transform, wavelets). Introduction to clustering (examples of clustering algorithms: serial algorithms, isodata, self organizing maps). Pattern matching (Bellman's optimality principle, dynamical programming, Levenshtein distance).

ΥΠΙ3 - Medical Imaging Systems

Code: ΥΠΙ3
Course Title: Medical Imaging Systems
Semester: 1st
Category: REQUIRED (Medical Informatics)
Lecture hours: 3
Instructor: Kandarakis (TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D439/

Course Description:

Diagnostic Radiology (x-rays, radiation-matter interactions, radiation detectors for Projection Imaging, Computed Radiography (CR), Digital Radiography (DR), Digital Fluoroscopy (DF), x-ray Computed Tomography (CT), Multi-slice Multi-detector Spiral CT (MSCT/MDCT). Nuclear Medicine (Radioactivity, Projection Imaging Detectors-Gamma Camera, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Hybrid and Combined Systems (SPECT/CT, PET/CT). Radiation Therapy (Radiation Dosimetry, Electron and Proton Accelerators, Treatment Planning, Portal Imaging, Cone-Beam Computed Tomography-CBCT). Ultrasonic Imaging-US (ultrasound production-piezoelectric transducers, B-mode, Doppler Effect, Color Flow Imaging etc). Magnetic Resonance Imaging-MRI (Magnetic Resonance, Pulse Sequences, k-space and image formation, functional MRI, MR Spectrosopy, Combined MRI/PET systems). Linear Systems Theory, Stochastic Processes (quantum image, signal and noise transfer, spatial resolution, Modulation Transfer Function (MTF), Noise Power Spectrum (NPS), Detective Quantum Efficiency (DQE), Entropy and Information Capacity). Image Reconstruction Algorithms (Filtered Back-projection for parallel and cone beam geometry, Iteration Algorithms with applications in SPECT and PET). Monte Carlo methods in Medical Imaging (Modeling efficiency and limitations, random sampling techniques, applications in Image Detectors).

ΥΠΙ4 - Advanced Topics in Signal Processing

Code: ΥΠΙ4
Course Title: Advanced Topics in Signal Processing
Semester: 1st
Category: REQUIRED (Medical Informatics)
Lecture hours: 3
Instructor: Karampogias (NKUA), Eleftheriadis (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D440/

Course Description:

Part 1: Stochastic signals, autocorrelation/cross-correlation, power spectral density, input-output relationship of LTE systems. 2-D Z transform, 2-D DFT, input-output relationship of 2-D LTE systems. Design of digital filters. Part 2: State-space system description, state variables. Dynamic equations, solution of dynamic equations, matrix exponentials, eigenvector representations. Dynamic equations and transfer functions. Controllable and observable realizations, stability. Part 3: multirate signals and systems. Decimation and interpolation. Noble's relationships. Polyphase representation of systems. Effective realizations of decimation and interpolation systems. Filter banks and wavelets.

ΥΠΙ5 - Statistical Signal Processing

Code: ΥΠΙ5
Course Title: Statistical Signal Processing
Semester: 1st
Category: REQUIRED (Medical Informatics), ELECTIVE (Bioinformatics)
Lecture hours: 3
Instructor: Theodoridis (NKUA)

Course web page: -

Course Description:

Stochastic processes, autocorrelation and cross correlation sequences, autocorrelation matrix and its properties. Optimal eigenvalue filters. AR, MA, ARMA processes. Wiener filters, the orthogonality principle, Wiener-Hopf equations, Levinson's algorithm and lattice structures. Adaptive systems, stochastic gradient descent algorithm, the LMS algorithm. Least squares filters, properties of the least squares estimator. Recursive least squares algorithm (RLS). Kalman filters. Applications for denoising and equalization.

ΥΠΙ6 - Acquisition and Processing of Biomedical Data

Code: ΥΠΙ6
Course Title: Acquisition and Processing of Biomedical Data
Semester: 2nd
Category: REQUIRED (Medical Informatics)
Lecture hours: 3
Instructor: Ventouras (TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D441/

Course Description:

Acquisition of bioelectric signals: Ionic cell currents. Electrodes. Bioelectric signals amplifier systems: ECG, EEG, EMG, ERG, EOG. Measurements of non-electric biosignals: mechanoelectric, thermoelectric, photoelectric and chemoelectric converters. Blood flow, pressure and volume measurements. Respiratory system measurements. Thermography. In-vitro diagnostic data acquisition technologies: Spectrophotometric methods, separation techniques. Clinical haematology technology. Immunochemical methods. Digital biomedical signal processing: biomedical data signal-to-noise improvement methods. Spectral analysis techniques for biomedical data. Principal and independent component analysis techniques (PCA-ICA). Autoregression (AR) analysis techniques. Inverse problem solution methods in biomedicine: point source techniques, distributed source techniques, Algebraic Reconstruction Techniques (ART), generalized inverse matrix techniques, regularization techniques. Applications to ECG, EEG, EMG and non-electric biosignals.

ΥΠ7 - Image Processing and Analysis

Code: ΥΠ7
Course Title: Image Processing and Analysis
Semester: 2nd
Category: REQUIRED
Lecture hours: 4
Instructor: Sangriotis (NKUA), Cavouras (TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D450/

Course Description:

Medical Imaging systems, principles of operation, imaging process, medical image quality. Medical

image enhancement, restoration, compression, tomographic reconstruction, algorithms for tomographic reconstruction. Image analysis, edge detection and linking, segmentation, morphological image processing. Color based image processing and analysis applications to proteomic and microarray images. Video processing and tracking.

ΥΠΙ8 - Medical Information Technology and Telemedicine

Code: ΥΠΙ8
Course Title: Medical Information Technology and Telemedicine
Semester: 2nd
Category: REQUIRED (Medical Informatics)
Lecture hours: 3
Instructor: Spyropoulos (TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D451/

Course Description:

1. The 21st Century Hospital: Biomedical Technology, Medical Informatics and Medical Decision-making.
2. Contemporary Medical Inference Models.
3. Electronic Health Records, Medical Guidelines and Evidence-based Medicine (The Greenes - Shortliffe Model).
4. Laboratory Information Systems.
5. Picture Archiving and Communication Systems and the DICOM quasi-Standard.
6. Computer-integrated Interventional Medicine (Surgical "Robots").
7. Information Technology in Transfusion Medicine.
8. Medical Procedures Cost Estimation Methods and Software.
9. Diagnosis Related Groups (DRGs).
10. The modern Telemedicine: Home-Care Information Technology Systems.
11. Nursing-Informatics: Codifications and Software.
12. Medical Information Retrieval Systems: The Unified Medical Language System (UMLS) and the employment of ICD-9/10, SNOMED etc. Medical Codifications.
13. Semantically Annotated Web-Services and the employment of the Health Level Seven (HL7) and Clinical Document Architecture (CDA) quasi-Standards.
14. Liability issues related to Decision Supporting Systems in Medicine and Continuous Digital Medical Education.

ΥΠΙ9 - Radiographic Anatomy

Code: ΥΠΙ9
Course Title: Radiographic Anatomy
Semester: 2nd
Category: REQUIRED (Medical Informatics)
Lecture hours: 3
Instructor: Oikonomou (Doctor Radiologist/TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D446/

Course Description:

Conventional Radiology (Plain Radiography: Examination technique – Normal anatomy – Abnormal findings. Examinations using contrast media: Examination technique – Findings – Digital imaging. Ultrasonography (US) (Examination procedure – Normal anatomy – Abnormal findings from several body organs – US in pregnancy. Special Applications: 3D ultrasonography – Endosonography – US guided interventional procedures – Vascular (Doppler) sonography). Computed tomography (CT) (Examination technique – Normal anatomy – Abnormal findings from several body systems Recent advances: Multislice CT – Virtual CT studies – Cardiovascular applications). Magnetic Resonance Imaging (MRI) (Examination technique – Normal anatomy – Abnormal findings from several body systems. Special Applications: MR angiography, MR spectroscopy). Mammography (Examination technique – Normal anatomy – Abnormal

findings. Digital mammography – Screening mammography – Localization procedures for impalpable lesions). Angiography (Examination technique – Normal anatomy – Abnormal findings – Therapeutic interventions). Bone densitometry (Examination technique – Normal values – Osteopenia – Osteoporosis).

ΥΠΒ3 - Algorithms in Molecular Biology

Code: ΥΠΒ3
Course Title: Algorithms in Molecular Biology
Semester: 1st
Category: REQUIRED (Bioinformatics)
Lecture hours: 4
Instructor: Koutsoupias (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D461/

Course Description:

Introduction to algorithms and computational complexity. General algorithmic techniques: Greedy algorithms, Divide and Conquer technique, dynamic programming, approximate and probabilistic algorithms, local search. Algorithms for sequence alignment (string matching), Markov chains and hidden Markov models (HMM). Asymptotic complexity, worst case complexity, average complexity. Algorithms for mapping, sequence analysis, structure prediction, phylogenetic trees.

ΥΠΒ4 - Introduction to Biotechnology

Code: ΥΠΒ4
Course Title: Introduction to Biotechnology
Semester: 1st
Category: REQUIRED (Bioinformatics)
Lecture hours: 3
Instructor: Vlahou (BRFAA), Tsangaris (BRFAA)

Course web page: http://eclass.di.uoa.gr/courses/D462/

Course Description:

Introduction to Terminology, Principles and Basic Methodology of Genomics and Proteomics. Recombinant genes and proteins, DNA sequencing, Polymerase Chain reaction, Human Genome Project, Chip Arrays. Contemporary protein profiling approaches, Protein Separation through 2-Dimensional Gel Electrophoresis and Liquid Chromatography, Introduction to Mass Spectrometry, Protein Arrays. Application of Bioinformatics in –omics data analysis, introduction to Systems Biology. Demonstration of infrastructure (Proteomics and Genomics Laboratory tour).

ΥΠΒ5 - Introduction to Bioinformatics

Code: ΥΠΒ5
Course Title: Introduction to Bioinformatics
Semester: 1st
Category: REQUIRED (Bioinformatics), ELECTIVE (Medical Informatics)
Lecture hours: 3
Instructor: Hatzigeorgiou (Fleming)

Course web page: -

Course Description:

Molecular Biology Primer (for Computer Scientists), Restriction Mapping Algorithms, Regulation and

Regulatory Motifs, Genome Rearrangements, Local and global sequence alignments, Gene prediction, Gene expression analysis, Non-coding RNAs, introduction to the programming language PERL, practical programming exercise as lab work.

ΥΠΒ6 - Biomedical Databases

Code: ΥΠΒ6
Course Title: Biomedical Databases
Semester: 2nd
Category: REQUIRED (Bioinformatics)
Lecture hours: 3
Instructor: Ioannidis (NKUA), Gunopulos (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D463/

Course Description:

Introduction to Databases: Design and modeling of databases. Architectures of database systems. Data models (hierarchical, network, relational). Relational algebra. The structured relational query language SQL. Developing advanced queries in SQL. Query by example. Advanced database topics: query processing. Query Optimization. Indexing techniques for high dimensional spaces. Managing data in XML. Data storage systems. Distributed databases. Biomedical databases. Advanced topics and applications: Examples of biomedical databases (databases of medical, clinical, proteomic, genomic data). Architectures for distributed biomedical databases. Query processing for distributed biomedical databases. Data mining for biomedical databases.

ΥΠΒ8 - Algorithms in Structural Bioinformatics

Code: ΥΠΒ8
Course Title: Algorithms in Structural Bioinformatics
Semester: 2nd
Category: REQUIRED (Bioinformatics)
Lecture hours: 3
Instructor: Emiris (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D464/

Course Description:

Introduction to structural biology; primary, secondary and tertiary structure. Dynamic programming and complexity; sequences and alignment, alignment with gaps. Structure comparison and alignment. Databases of biological information (e.g. Protein Data Bank), experimental data from Nuclear Magnetic Resonance and X-ray crystallography. Study and computation of 3D structure, conformational search. Distance geometry, triangular and tetrangle inequality, distance matrix. Molecule kinematics and rigid transformations; degrees of freedom. Solving of polynomial systems via linear algebra. Molecular surface modeling and flexibility; Delaunay triangulation, alpha-shapes. Applications to protein docking. Geometric data structures and geometric hashing.

ΥΠΒ9 - Machine Learning Methods in Computational Biology

Code: ΥΠΒ9
Course Title: Machine Learning Methods in Computational Biology
Semester: 2nd
Category: REQUIRED (Bioinformatics)
Lecture hours: 3
Instructor: Manolakos (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D436/

Course Description:

Parameter estimation methods (EM algorithm, mixture models), feature extraction methods (PCA, PLSR, etc.), data classification methods (hierarchical, k-means, SOM, etc.). Neural networks (supervised/ unsupervised), Bayesian networks, graphical models. Parallel processing for machine learning. Machine learning applications in Computational Biology: decoding DNA sequences, identification of mutations (SNPs), data analysis and categorization of gene expression profiles (microarrays), data processing and classification of proteomics and metabolomics data (2D gels, LC-MS, Seldi –MS spectra). Gene and protein interaction networks, extraction of biological system models from multidimensional heterogeneous bioinformatics data. Models comparison methods, multidimensional data visualization, applications to systems biology. Developing algorithms and software for practical problem solving using real data.

ΕΠ1 - Embedded Systems

Code: ΕΠ1
Course Title: Embedded Systems
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Manolakos (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D453/

Course Description:

Microcontrollers, reconfigurable embedded systems, autonomous systems, ambient intelligence. Implementation of embedded systems (ES) with ASICs, FPGAs and intellectual property cores (IP cores). Systems with general and special purpose processors in a single integrated circuit (Systems on Chip). Power Management in ES. Hierarchical design of embedded SoCs, hardware-software codesign. System design and synthesis technologies. System software issues: Multithreading, synchronization scheduling mechanisms. Managing multiple processes, real-time operating system kernels. Examples of embedded systems for automatic control, wireless sensor networks. Applications of modern microelectronics and ES in biomedicine. ES and nanotechnology, biosensors, research trends.
Laboratory component: Design using the VHDL hardware description language of an embedded SoC and implementation using FPGAs. Recommended knowledge: Digital Systems Design, VHDL, computer programming with C.

ΕΠ2 - Real-time Systems

Code: ΕΠ2
Course Title: Real-time Systems
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Maroulis (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D454/

Course Description:

Introduction and fundamentals of real-time systems (definitions, requirements, properties, predictability-determinism, reliability). Techniques and development tools, analysis, design. Data flow diagrams (events, transforms, control), state diagrams (states, transitions, conditions, actions), entity-relationship diagrams (entities, relationships, objects, rules). Accompanying documentation, event list, behavioural models. Modelling, processor architecture (specifications, evaluation, requirements, multithreading, hyperthreading, interfaces, control processes). Real-time operating systems. Software modelling (architecture, processes, parallelism, security, evaluation). Modern architectures and advanced data acquisition methods in real-time biomedical systems. Software development for real-time biomedical applications, performance analysis and optimization. Network and internet real-time applications in the field of telemedicine. Practical applications, focusing on the acquisition, processing and analysis of biomedical data for providing assistance in medical diagnosis.

ΕΠ3 - Biomedical Data Mining and Knowledge Discovery

Code: ΕΠ3
Course Title: Biomedical Data Mining and Knowledge Discovery
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Karkaletsis (Demokritos), Gunopulos (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D455/

Course Description:

Information Extraction (IE) techniques enable the identification of documents related to a given subject (e.g. scientific articles on allergies), extract predefined types of information from documents that have been identified (eg data allergens) and store the exported information.
The goal of Data Mining (DM) is to reveal or produce functional knowledge through the analysis of data such as the data extracted by an IE system, or data stored in other ways in databases.
IE combines natural language processing technologies for document analysis, machine learning to adapt new tools to IE thematic areas, and knowledge management for the representation of knowledge of the relevant thematic area and the use of the various stages of IE.
DM combines the machine learning and statistical analysis techniques for learning classifiers and predictive models from data.
Over the course will present IE and DM techniques applied on biomedical data through relevant case studies. Students of the program will also use various IE and DM tools and apply them on biomedical data.

ΕΠ4 - Biostatistics

Code: ΕΠ4
Course Title: Biostatistics
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Linardatos (ΕΕΤΤ)

Course web page: http://eclass.di.uoa.gr/courses/D456/

Course Description:

Basic issues of probabilities. Special forms of one-dimensional probability density functions (Poisson, exponential, normal, Weibul). Hypothesis and significance testing in one-dimensional distributions. Confidence Intervals. Bayes Estimation. Analysis of Variance. Regression Analysis. Multivariate normal distribution. Multivariate Analysis of Variance and Hypothesis Testing. Covariance matrices. Fisher and Bayes Discriminant Functions. Multivariate Regression, Logarithmic Regression. Non-parametric Hypothesis Testing and Non-parametric Classifiers. Principal Component and Independent Component Analysis. Analysis and Estimation of Survival Data.

ΕΠ5 - Simulation Methods in Medicine and Biology

Code: ΕΠ5
Course Title: Simulation Methods in Medicine and Biology
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Spyrou (BRFAA)

Course web page: http://eclass.di.uoa.gr/courses/D457/

Course Description:

The main objective of this course is the introduction to the concepts and methodologies of applied modeling and simulation in the modern fields of Medicine and Biology, aiming to the prediction capability in issues where experimentation is impossible or very expensive. The issues that are covered in the course are the following: Selected Theory Elements of Probability and Statistics, Random Numbers, Pseudo-random Number Generators, Random Sampling Methods, Variance Reduction Techniques, Markov Series, Hidden Markov Models, Photon Tracing Simulations, Monte Carlo simulations in Medical Imaging and Nuclear Medicine, Monte Carlo simulations in Radioprotection and Radiotherapy, Molecular Dynamics, Applications of HMMs and Monte Carlo in Genomics and Proteomics, Drug Design Simulations, Simulations in Parallel Computing, Applications in Computer Clusters and Grid Architectures.

ΕΠ6 - Methods and Applications in Neurosciences

Code: ΕΠ6
Course Title: Methods and Applications in Neurosciences
Semester: 3rd
Category: ELECTIVE
Lecture hours: 3
Instructor: Cutsuridis (Boston University, USA)

Course web page: http://eclass.di.uoa.gr/courses/D458/

Course Description:

An introduction to single neuron and populations of neurons computations for graduate students interested in studying how nerve cells integrate and transmit signals and how perception, cognition and memory emerges from the integrated actions of populations or circuits of nerve cells. The course covers basic notions of electrical and biochemical properties of single neurons, the electrical and chemical communication between neurons, the anatomy, physiology and function of each of the major brain structures and systems and how behavior emerges from their actions. Emphasis will be given on mathematical descriptions and computational techniques used to study and understand neurons and network of neurons such as: Hodgkin-Huxley models, cable theory, integrate-and-fire neurons, multicompartmental modeling, riring rate models, various types of neural networks (feedforward, associative, linear recurrent, stochastic, etc.), central pattern generators, topographic maps, receptive fields, elements of information theory (entropy and mutual information, etc.) spike-train statistics, reverse-correlation methods, rate vs temporal processing, population vector coding, adaptation and learning (Hebbian learning, LTP/LTD, STDP, supervised, unsupervised learning), classical conditioning, reinforcement learning (Markov decision processes, actor-critic model, etc.).

ΕΠΙ7 - Intelligent Medical Systems

Code: ΕΠΙ7
Course Title: Intelligent Medical Systems
Semester: 3rd
Category: ELECTIVE (Medical Informatics)
Lecture hours: 3
Instructor: Maroulis (NKUA), Savelonas (NKUA)

Course web page: http://eclass.di.uoa.gr/courses/D459/

Course Description:

Introduction to intelligent systems: motivation, problem solving, definitions, clinical data. Expert systems. Methods to cope for missing medical data. Statistical learning theory and machine learning. Feature extraction and selection in medical data. Clustering. Fuzzy representation of medical parameters. Optimization heuristics and genetic algorithms. Medical decision support systems. Evaluation of intelligent medical systems, ROC curves. Applications.

ΕΠΙ8 - Special Topics on Network Design

Code: ΕΠΙ8
Course Title: Special Topics on Network Design
Semester: 3rd
Category: ELECTIVE (Medical Informatics)
Lecture hours: 3
Instructor: -

Course web page: -

Course Description:

This is a seminars based course. It is offered periodically and its content is adjusted depending on the instructor.
Its aim is to provide an opportunity for distinguished scientists/scholars with a recognized track record, visiting us either from a domestic or a foreign institution, to offer a special topics course in the field of their interests and specialization.

ΕΠΙ10 - Contemporary Hospital and Health - Care Services: Organization and Operation

Code: ΕΠΙ10
Course Title: Contemporary Hospital and Health-Care Services: Organization and Operation
Semester: 3rd
Category: ELECTIVE (Medical Informatics)
Lecture hours: 3
Instructor: Spyropoulos (TEI-A)

Course web page: http://eclass.di.uoa.gr/courses/D460/

Course Description:

1. The historical course of the development of the Hospital.
2. Infrastructure and functional Planning of modern Hospital Departments:

   * Emergency Department.
   * Outpatient Department.
   * In vitro Diagnostic Laboratories.
   * Bloodbank.
   * Medical Imaging.
   * Surgical Departments.
   * Intensive Care Units.
   * Nursing Wards.
   * Radiotherapy and other special treatment Units.
   * Hospital Supporting Facilities.

3. Medical Equipment and Hospital Supplies.
4. Supporting medical-managerial Decision-making in the individual Departments and Units of the contemporary Hospital.
5. Patient and Personnel Safety-management in the Hospital Environment.
6. The multifarious function of the Electronic Health Record in contemporary Health-Care Services
7. Financial-Managerial approaches of contemporary Health-care Services.
8. Continuous interdisciplinary Education in the modern Hospital.
9. The emerging Networked-Society 21st Century Hospital and the modern Mobile Health-Care.
10. Social, Ethical and Legal Issues related to contemporary Health-Care Services:

    * The development of Health Insurances.
    * Biomedical Ethics and Professional Codes of Conduct.
    * Medical and other Health Professional Liability.

* Medical Equipment Manufacturer Liability.

11. Industrial Property Rights focused on Biomedical Technology and Informatics.

ΕΠ11 - Special Topics on Informatics and Biomedical Applications

Code: ΕΠ11
Course Title: Special Topics on Informatics and Biomedical Applications
Semester: 3rd
Category: ELECTIVE (Medical Informatics)
Lecture hours: 3
Instructor: -

Course web page: -

Course Description:

This is a seminars based course. It is offered periodically and its content is adjusted depending on the instructor.
Its aim is to provide an opportunity for distinguished scientists/scholars with a recognized track record, visiting us either from a domestic or a foreign institution, to offer a special topics course in the field of their interests and specialization.

ΕΠΒ7 - Advanced Biotechnology

Code: ΕΠΒ7
Course Title: Advanced Biotechnology
Semester: 3rd
Category: ELECTIVE (Bioinformatics)
Lecture hours: 3
Instructor: Sanoudou (BRFAA), Garbis (BRFAA)

Course web page: http://eclass.di.uoa.gr/courses/D466/

Course Description:

The course is aiming at presenting the main principles of advanced genomics and proteomics technologies, the most important applications of these technologies in research and clinical practice, and the key bioinformatical questions / needs that arise. Towards these goals the lectures cover topics including: advanced concepts on LC-MS based quantitative proteomic methods, multidimensional liquid chromatography, ionization methods, mass analyzers, interpretation of tandem mass spectra, , advanced fluorescent in situ hybridization methodologies, DNA microarrays, advanced microarray applications, knock-out and transgenic animal models, siRNA and miRNA principles, as well as data extraction, processing, archiving and distillation.

ΕΠΒ9 - Special Topics on Bioinformatics

Code: ΕΠΒ9
Course Title: Special Topics on Bioinformatics
Semester: 3rd
Category: ELECTIVE (Bioinformatics)
Lecture hours: 3
Instructor: -

Course web page: -

Course Description:

This is a seminars based course. It is offered periodically and its content is adjusted depending on the instructor.
Its aim is to provide an opportunity for distinguished scientists/scholars with a recognized track record, visiting us either from a domestic or a foreign institution, to offer a special topics course in the field of their interests and specialization.