Table of Contents

CSIS1-1 - Statistics and Data Visualization

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Statistics and Data Visualization

Course id: CSIS1-1
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS101/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

The aim of this course is to help students get to know and learn a variety of basic statistical tools, useful for for Data Science. Students will learn how to convert raw data into descriptive summaries that can be easily visualized and understood. In addition, it will introduce students to the fundamental concepts of Statistical Inference, such as parameter estimation and Hypothesis Control, as well as multivariate statistical tools useful in Business Analytics, such as Regression Analysis, Factor Analysis and Analytical Analysis. To implement all of the above, the R language will be used, so that students become familiar with the specific software and can perform any data analysis.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Team work
Work at an interdisciplinary framework
Formulation of new research ideas
Promoting reasoning and self improvement
Promoting free, creative and deductive reasoning

Course Content

Advanced Topis in Probabity Theory (Stochastic Processes, Queuing Theory). Theory of Point Estimation and Statistical Inference. Simple and Multiple Linear Regression. General Linear Models (Logistic Regression). Multivariate Statistical Analysis- Dimension Reduction (Principal Components Analysis, Factor Analysis)-Cluster Analysis (Hierarchical and k-means). Methods

of Data Visualization. R Language.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Χρήση e-class, e-studies. Γλώσσα R.

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	40
Independent Study	84
Total	**150**

Assessment

Student evaluation is based upon the written submission and presentation of a final written assignment at the end of teaching whose grade corresponds to 100% of the final grade.
The basic criteria for evaluating the written work of the students are:
- proof of use of tools, methods and libraries which have been presented during the semester lectures and labs
- critical analysis and understanding of problems at hand and presentation of analysis results
- the completeness of the conclusions and proposals
- the general structure and form of the work (sections, paragraphs, figures, tables)
- the adequacy of the presentation

All of the above assessment criteria are made known to the students in the first lesson.

Literature

● T.W. Anderson, “An Introduction to Multivariate Statistics”, John Wiley Sons, 1984.

● D.R. Anderson, D. Sweeney and T. Arthur, “Statistics for Business and Economics”, Mason, OH : South-Western Thomson Learning, 2002.

● A. Basilevski, “Statistical Factor Analysis and Related Methods. Theory and Applications”, John Wiley Sons, 1994.

- J. Chambers, W. Cleveland, B. Kleiner and P. Tukey, “Graphical Methods for Data Analysis”, Wadswoth Brooks/Cole, Pacific Grave, C.A., 1983

- D. Freedman, R. Pisani, R. Purves and A. Adbikari, “Statistics”, 4th ed., Norton, New York, 2007

- J. Tukey, “Ëxploratory Data Analysis”, Addison-Wesley, Reading, MA., 1977.
- Δ. Καρλής, «Πολυμεταβλητή Στατιστική Ανάλυση», Εκδόσεις Σταμούλη, Αθήνα, 2005
- Α. Κυριακούσης, «Στατιστικές Μέθοδοι», Εκδόσεις Συμμετρία, Αθήνα, 2000.

Journal of the American Statistical Association

CSIS1-2 - Machine Learning

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Machine Learning
Course id: CSIS1-2
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS127/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Upon successful completion of this course, students are expected to have deep understanding of basic machine learning principles, as well as of the most important machine learning methods. They are also expected to have the ability to apply these methods to practical problems with the use of modern software libraries.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Promoting reasoning and self improvement
Promoting free, creative and deductive reasoning

Course Content

- Introduction to machine learning - definitions
- Generalization, underfitting and overfitting
- Quick recap of necessary mathematical background (linear algebra, univariate and multivariate calculus, probability theory, optimization theory)
- Linear Discriminant Analysis
- Introduction to scikit-learn
- Quick introduction to data preparation methods
- Linear regression and the least squares method
- Linear classification and Generalized Linear Models
- Nonparametric methods - kNN and kernel methods
- Classification and Regression Trees - CART
- Ensemble methods - Random Forests, Gradient Boosting Trees, AdaBoost and their variations
- Presentation of the XGBoost environment
- Introduction to Artificial Neural Networks
- Introduction to Pytorch
- Training ANNs and backpropagation

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Ανάπτυξη λογισμικού σε γλώσσα Python με χρήση Numpy, Pandas, scikit-learn, XGBoost και Pytorch. Προετοιμασία δεδομένων και ανάπτυξη μοντέλου.

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	60
Independent Study	64

Total	**150**

Assessment

Individual student projects

Literature

- Murphy, K. P. (2022). Probabilistic machine learning: an introduction. MIT press.
- Murphy, K. P. (2023). Probabilistic machine learning: Advanced topics. MIT press.
- Hastie, T., Tibshirani, R., Friedman, J. H., Friedman, J. H. (2009). The elements of statistical learning: data mining, inference, and prediction (Vol. 2, pp. 1-758). New York: springer.
- Goodfellow, I., Bengio, Y., Courville, A. (2016). Deep learning. MIT press.
- Bishop, C. M., Nasrabadi, N. M. (2006). Pattern recognition and machine learning (Vol. 4, No. 4, p. 738). New York: springer.

Περιοδικά (ενδεικτικά):

IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Neural Networks and Learning Systems
Expert Systems with Applications
Journal of Machine Learning Research
Machine Learning
Journal of Artificial Intelligence Research
Neural Computing and Applications

Συνέδρια (ενδεικτικά):

Neural Information Processing Systems (NeurIPS)
International Conference on Machine Learning (ICML)
International Conference on Learning Representations (ICLR)
AAAI Conference on Artificial Intelligence (AAAI)
Computer Vision and Pattern Recognition (CVPR)
International Conference on Computer Vision (ICCV)
International Joint Conference on Artificial Intelligence (IJCAI)
European Conference on Machine Learning (ECML)
Asian Conference on Machine Learning (ACML)

CSIS1-3 - Data mining and Recommender Systems

General Information

School: Digital Technology

Department: Informatics and Telematics
Level: Postgraduate
Course Title: Data mining and Recommender Systems
Course id: CSIS1-3
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/DIT287/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Proficiency in Data Mining Techniques:
- Understanding Algorithms: Mastery of various data mining algorithms for clustering, association rule mining, anomaly detection, etc.
- Application Skills: Ability to apply these algorithms to different datasets and scenarios effectively.

Expertise in Recommender Systems:
- Comprehensive Knowledge: Understanding different types of recommender systems and their implementation.
- Hands-on Experience: Practical experience in building and evaluating recommendation models.

Data Handling and Analysis Skills:
- Data Preprocessing Mastery: Proficiency in data cleaning, transformation, and preparation for analysis.
- Dimensionality Reduction Techniques: Understanding and applying methods like PCA/SVD for efficient data representation.
- Feature Selection: Ability to select relevant features for analysis and model building.
- Anomaly Detection: Capability to identify outliers and anomalies within datasets.

Time Series Analysis Competency:
- Understanding Time Series Data: Proficiency in analyzing time-dependent data using techniques like ARMA/ARIMA.
- Forecasting Skills: Ability to make predictions and forecasts based on time series analysis.

User Profiling and Content Filtering Skills:

- User Profiling: Understanding user behavior and creating profiles for personalized services or recommendations.
- Collaborative Filtering: Ability to utilize collaborative filtering techniques, including matrix/tensor factorization.
- Content Filtering: Understanding and implementing content-based recommendation methods.

Practical Application and Research:
- Hands-on Project Work: Experience in implementing learned concepts in real-world datasets.
- Research Skills: Ability to explore advanced topics and potentially contribute to research in the field.

Critical Thinking and Problem-Solving:
- Analytical Skills: Enhanced ability to analyze complex datasets and derive meaningful insights.
- Problem-Solving Approach: Proficiency in addressing data-related challenges using appropriate methods and tools.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Independent work
Team work
Promoting free, creative and deductive reasoning

Course Content

Classification
Clustering
Data preprocessing
Dimensionality reduction
PCA / SVD
Feature selection
Anomaly detection

Timeseries analysis (ARMA / ARIMA)

Association rule mining
User profiling
Content filtering
Collaborative filtering, incl. Matrix / tensor factorization

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:

η-τάξη, παρουσιάσεις, παραδείγματα κώδικα

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	60
Independent Study	64
Total	**150**

Assessment

Group project with presentation and final exam

Literature

Carlo Vercellis. Business Intelligence: Data Mining and Optimization for Decision Making Wiley. 2009
Charu Aggarwal, ChengXiang Zhai Mining Text Data, Springer 2012.
Bing Liu, Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data Data-Centric Systems and Applications, Springer 2008.
Ian Witten, Eibe Frank, Data Mining, Practical machine learning tools and techniques Elsevier, Morgan Kaufmann, 2005
Rob Sullivan, Introduction to Data Mining for the Life Science. Springer 2012.
Robert Stackowiak, Joseph Rayman, Rick Greenwald. Oracle Data Warehousing and Business Intelligence Solutions, Wiley, 2007
Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Elsevier, Morgan Kaufmann, 2006
Aggarwal, C. C., Aggarwal, C. C. (2016). An introduction to recommender systems. Recommender systems: The textbook, 1-28.

Data Mining and Knowledge Discovery
IEEE Transactions on Knowledge and Data Engineering
Journal of Big Data
ACM Transactions on Intelligent Systems and Technology (TIST)
Knowledge and Information Systems
ACM Transactions on Recommender Systems
Frontiers in Recommender Systems
Social Network Analysis and Mining

CSIS1-4 - Big Data Management

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Big Data Management
Course id: CSIS1-4
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS126/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

Modern applications on the internet have created the need for everyday handling of huge data volumes. Executing algorithms on datasets much larger than the available memory cannot easily be dealt with traditional techniques. The course offers students the necessary knowledge and skills in order to solve problems which involve handling of huge datasets which cannot be stored in memory. The course is split into two parts. In the first part we describe the architecture of distributed systems capable of handling vast amounts of data, while in the second part we describe the corresponding algorithmic techniques.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Decision Making, Independent work, Team work, Promoting free, creative and deductive reasoning

Course Content

1st week Lecture: Introduction to Big Data. Advanced computational and storage models.
2nd week Lecture: Introduction to advanced distributed systems.
3rd week Lecture: Distributed file systems and the MapReduce platform for parallel computing.
4th week Lab: Practical application. The Hadoop framework.
5th week Lecture: Spark architecture and implementation of algorithms with RDDs.

6th week Lecture: Data processing with the Scala programming language in Spark.
7th week Lab: Practical application. The Spark framework.
8th week Lecture: Basic algorithms with MapReduce and Spark. High-level languages for data analysis.
9th week Lecture: Entity Resolution in Spark.
10th week Lecture: Resource management in distributed systems: YARN, Mesos, Kubernetes.
11th week Lecture: Managing Data Streams: Spark Structured Streaming.
12th week: Student presentations.
13th week: Student presentations.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	72
Independent Study	52
Total	**150**

Assessment

I. Final exam 50% which includes:
- Multiple choice questions
- Problem solving
- Comparative evaluation of theory elements

II. Individual assignments 30% assessed in two stages: description of the proposed approach, implementation.
III. Group assignments 20%: presentation of selected research papers

Literature

Jure Leskovec, Anand Rajaraman, Jeff Ullman: Mining of Massive Datasets. Cambridge University Press 2020.
Sandy Ryza, Uri Laserson, Sean Owen, Josh Wills. Advanced Analytics With Spark: Patterns for Learning from Data at Scale. O'Reilly Media 2017
Jacek Laskowski. Apache Spark Internals. [Online] 2023

The International Journal on Very Large Data Bases (VLDBJ)
Proceedings of the VLDB Endowment (PVLDB)
IEEE Transactions on Big Data
IEEE Transactions on Knowledge and Data Engineering (TKDE)

CSIS2-1 - Cloud Infrastructures

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Cloud Infrastructures
Course id: CSIS2-1
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS114/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Upon completion of the course, students will be able to:

Implement cloud infrastructures on bare metal.
Install basic services on public or private clouds.
Configure monitoring tools for cloud infrastructures.
Automate management processes through SDKs/APIs of virtualization environments.

General Skills

-Search, analysis and synthesis of data and information with the use of the assorted technologies
-Adaptation in new conditions
-Decision Making
-Independent work
-Team work

Course Content

The course covers the fundamental elements of cloud infrastructure. Specifically, the topics covered are as follows:

1. Basic service layers
2. Resource management
3. Cloud Hardware: server hosts, storage arrays, backup appliances
4. Public vs Private Cloud.
5. Proxmox virtualization environment
6. Virtual machines: basic features, configuration, and management in Proxmox
7. Virtual networking: configuration and management
8. Automated management: the case of Proxmox API
9. Infrastructure Monitoring Tools: the case of Zabbix
10. High Availability Techniques

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass
Proxmox

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	70
Independent Study	54
Total	**150**

Assessment

Course Assignments

Literature

-Portnoy, Matthew. Virtualization Essentials. United Kingdom: Wiley, 2023.
-Building Cloud and Virtualization Infrastructure: A Hands-on Approach to Virtualization and Implementation of a Private Cloud Using Real-time Use-cases (English Edition). India: BPB Publications, 2021.

-IEEE Cloud Computing Journal
-IEEE Transactions on Cloud Computing Journal
-Journal of Grid Computing - Springer

CSIS2-2 - Cloud Platforms

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Cloud Platforms
Course id: CSIS2-2
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS104/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

The aim of the course is to become familiar with management, automation and monitoring tools for physical or virtual computing units. Also cloud application management and development.

Upon successful completion of the course, the student will be able to manage and automate several software installation/configuration processes as well as the preparation of the infrastructure and services that will support modern information systems.

General Skills

- Adaptation to new situations, Teamwork, Promotion of free, creative and inductive thinking

Course Content

Higher service layers
Object Storage Services

Containers and Orchestration
Serverless Architectures
Systems Architectural Patterns
Platform automation (deployment, operation, workflows, integration)
Optimizing Platform Management and Performance
DevOps Systems and Tools

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	58
Independent Study	66
Total	**150**

Assessment

Group Assignments

Literature

Scholl, Boris, Trent Swanson, and Peter Jausovec. Cloud native: using containers, functions, and data to build next-generation applications. " O'Reilly Media, Inc.", 2019.
Beyer, Betsy, et al. Site Reliability Engineering: How Google Runs Production Systems. OReilly Media, Inc., 2016.
Geerling, Jeff. Ansible for DevOps: Server and configuration management for humans. Leanpub, 2015.

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CSIS2-3 - IoT Technologies and Applications

General Information

School: Digital Technology
Department: Informatics and Telematics

Level: Postgraduate
Course Title: IoT Technologies and Applications
Course id: CSIS2-3
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS116/

Activities

Lectures (Theory): 2
Lab lectures: 8
ECTS credits: 6

Learning Outcomes

Experience in designing services and applications based on IoT

General Skills

Decision Making
Independent work
Employment at an international level
Formulation of new research ideas
Project design and management

Course Content

Basic IoT concepts
Modern IoT architectures
Communication protocols in IoT environments
Basic concepts of edge computing
Advanced IoT and edge computing applications in transportation
Advanced IoT and edge computing applications in energy
Advanced IoT and edge computing applications in health

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
e-class

Course Organization

Activity	Semester work load
Lectures	18
Lab exercises	8
Thesis	49
Independent Study	75
Total	**150**

Assessment

Personal project

Literature

IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things
by David Hanes , Gonzalo Salgueiro , et al. | Jun 23, 2017

Ji, Baofeng, et al. "Survey on the internet of vehicles: Network architectures and applications." IEEE Communications Standards Magazine 4.1 (2020): 34-41.

CSIS3-1 - Strategic Business Administration

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Strategic Business Administration
Course id: CSIS3-1
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS122/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

Information Systems Strategy Planning and Assessment based on Economic Indicators. Execution of Strategic and Economic Information Systems Plan. Implementation of initiatives and projects of Digital Transformation to achieve growth and business excellence. Business Models and Information Systems.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Decision Making, Independent work, Team work, Employment at an international level, Work at an interdisciplinary framework, Formulation of new research ideas

Course Content

1. Business Strategy and Information Systems Strategy
2. Business Models and Business Applications by Industry
3. New application technologies and data management and relationship with business sustainability and growth
4. Business Plan and Business Systems Applications Landscape alignment
5. Business Models and Information Systems, Development and Operating Expenses
6. Design and Implementation of a Strategic and Economic Information Systems Plan
7. Microeconomics, Supply, Demand, Marginal Analysis
8. Market Models, Monopoly and Competition, The Software Market and Attributes, Software Models Business Models
9. OPEX-CAPEX concepts and examples
10. ROI, NPV, IRR, payback investment KPIs
11. Case Studies for BI, Data Analytics, Smart Cities, Cloud, Maas
12. Innovation, Business Strategy and Enterprise Systems

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
2 project assignments

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	44
Independent Study	80
Total	**150**

Assessment

2 project assignments

Literature

Strategy, Economics and Information Systems

Government Information Quarterly
Information Systems Management
Information Systems Frontiers

CSIS3-2 - Information Systems Management

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Information Systems Management
Course id: CSIS3-2
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS117/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

Integrated Business Systems Application Landscape Design and Analysis. Alignment of data structures, business processes and business systems applications functionality. Digital Transformation design and implementation aligned with Systems Landscape. Design and Analysis of Business Processes for critical Business System Applications. Understanding the management of major business systems with case studies. Taxonomy business systems by Industry. Legacy Systems Data Management and Migration.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Decision Making, Independent work, Team work, Work at an interdisciplinary framework

Course Content

1.Definitions, concepts and methodologies of technology management
2. Analysis, Design and Management of Business Information Systems
3. Design and Implementation of an Integrated Business System Applications Landscape
4. Data, Business Processes and Business Applications with Case Studies by Industry
5. Change Management and System Landscape
6. Business Application Lifecycle and Integration Issues
7. Digital Business and Information Systems
8. Business Application Modeling and Data Flowcharts
9. Best practices for designing integrated solutions and phases of business application development
10. Performance and efficiency KPIs of systems and applications
11. Study of business systems such as ERPs, CRMs, SCM, KMS, DSS, ESS, BI
12. Business Intelligence, BI Apps, Data Analysis, Support and Decision Making Systems, Management Systems

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies, case tools

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	44
Independent Study	80
Total	**150**

Assessment

2 projects assignments

Literature

Management Information Systems: Strategy and Governance
Management of Information Systems
Management and Information Systems

- Technological Forecasting and Social Change
- International Journal of Information Management
- Journal of Strategic Information Systems
- Information Systems Management
- Information Systems Frontiers

CSIS3-3 - Requirements Analysis and Software Design

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Requirements Analysis and Software Design
Course id: CSIS3-3
Type: Obligatory
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS110/

Activities

Lectures (Theory): 2
Lab lectures: 8
ECTS credits: 6

Learning Outcomes

The course objectives are to provide the required theoretical training and practical, laboratory practice to students, so that they are able to deal with the issue of developing an Information System with adequacy. Emphasis is placed on the basic principles and procedures that must be observed in all phases of development: Design phase project plan, Analysis phase requirements definition, process and data modeling, Design phase architecture, user interface,

Implementation phase management development, testing, documentation, transition. Emphasis is also placed on object-oriented analysis and design utilizing UML.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Team work

Course Content

Introduction to Systems Analysis and Design Project Management Project Work Plan, Gantt Chart Analysis Modeling Requirements Determination Business Process And Functional Modeling Use Case Diagrams, Activity Diagrams Structural Modeling Class Diagrams ,Object Diagrams Behavioral Modeling State Machine Diagrams, Sequence Diagrams Data Management Layer Design Design Modeling Package Diagrams Physical Architecture Layer Design Component, Deployment Diagrams Implementation Phase Prototype Development Humancomputer Interaction Layer Design Wireframes

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	28
Lab exercises	8
Thesis	58
Independent Study	66
Total	**150**

Assessment

Written exams, Group Assignments

Literature

Systems analysis and design: An object-oriented approach with UML, 5th Edition by Dennis, Wixom, and Tegarden, Wiley eclass Systems Analysis Design, Dennis, Wixom, Roth, 5th Edition, Wiley Software Engineering, Ian Sommerville 10th Edition

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CSIS-E10 - Natural Language Processing and Information Retrieval

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Natural Language Processing and Information Retrieval
Course id: CSIS-E10
Type: Elective
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS105/

Activities

Lectures (Theory): 2
Lab lectures: 8
ECTS credits: 6

Learning Outcomes

- Proficiency in various text representation models used in Natural Language Processing (NLP) and Information Retrieval (IR).
- Ability to apply and utilize Bag of Words and tf-idf techniques for text representation and feature extraction.
- Understanding the fundamentals of information retrieval and its various methods.
- Mastery in using vector-space methods for information retrieval tasks.
- Familiarity with evaluation metrics used in assessing the performance of information retrieval systems.
- Understanding different language models used specifically in information retrieval.
- Proficiency in various word representation models used in NLP tasks.
- Ability to work with word embeddings like word2vec for semantic representation of words.
- Understanding and practical knowledge of Transformer-based models such as BERT and GPT for language understanding and generation tasks.
- Ability to apply NLP techniques in various application-specific contexts, such as sentiment analysis, text classification, or named entity recognition.
- Understanding techniques used in content-based retrieval systems for multimedia data.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Decision Making
Independent work
Team work
Work at an interdisciplinary framework
Promoting free, creative and deductive reasoning

Course Content

Text representation models
Bag of words, tf-idf
Information retrieval
Vector-space methods for IR
Information retrieval evaluation metrics
IR and language models
Word representation models
Word embeddings (word2vec)
RNN-LSTM
Transformers - BERT, GPT
Application-specific NLP
Content-based multimedia retrieval

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
η-τάξη, παρουσιάσεις, παραδείγματα κώδικα

Course Organization

Activity	Semester work load
Lectures	18
Lab exercises	8
Thesis	60
Independent Study	64
Total	**150**

Assessment

Group and/or individual project with presentations

Literature

Schütze, H., Manning, C. D., Raghavan, P. (2008). Introduction to information retrieval (Vol. 39, pp. 234-265). Cambridge: Cambridge University Press.

Jurafsky, D., Martin, J. H. (2000). Speech language processing. Pearson Education.

Li, H. (2022). Learning to rank for information retrieval and natural language processing. Springer Nature.

Manning, C., Schutze, H. (1999). Foundations of statistical natural language processing. MIT press.

Information Retrieval Journal
International Journal of Information Retrieval Research
International Journal of Multimedia Information Retrieval
Transactions of the Association for Computational Linguistics, ACL
IEEE/ACM Transactions on Audio, Speech, and Language Processing

CSIS-E2 - Full Stack Programming on the World Wide Web

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Full Stack Programming on the World Wide Web
Course id: CSIS-E2
Type: Elective
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS108/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

The aim of the course is to provide graduate students with the basics and hands-on experience for designing and developing applications on the World Wide Web. The focus is on both server- and client-side development technologies, covering the full range of intermediate technologies, protocols, patterns and systems. By the end of the course, students are expected to be able to: - understand with minimal effort any technology, design pattern, protocol, tool, programming language or Web application - designing applications based on the MVC framework or similar - implement dynamic applications using Javascript and NodeJS

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Decision Making, Independent work, Promoting free, creative and deductive reasoning

Course Content

The course invests particularly in the hands-on exercise, emphasizing on the implementation of exercises and examples together with the teaching staff in the laboratory. The assignment includes the implementation of a complete web application while the examination is based on practical comprehension issues and not on memorization. The main modules in which the content of the course is structured are the following:
Module 1: Basic concepts of the web. The HTTP protocol.
Module 2: Client-side programming. The Javascript programming language. Event scheduling. The document object model DOM.
Module 3: Server-side programming. Programming Models, REST
Module 4: Introduction to NodeJS
Module 5: Markup Languages
Module 6: Hybrid Programming Models. The Ajax framework. Introduction to Javascript frameworks for front-end development such as JQuery, UI thread and web workers.
Module 7: NodeJS and NPM / Python Flask. Advanced topics: modules, callbacks, promises, async-await, arrow functions, events, websockets
Module 8: Web Design Patterns
Module 9: Javascript frameworks: ReactJS
Module 10: Javascript frameworks: AngularJS
Module 11: Javascript frameworks: AngularJS
Module 12: Website performance considerations

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	69
Independent Study	55
Total	**150**

Assessment

Assignment-based evaluation

Literature

- Marijn Haverbeke, Eloquent JavaScript, 3rd Edition: A Modern Introduction to Programming - Mario Casciaro and Luciano Mammino, Node.js Design Patterns: Design and implement production-grade Node.js applications using proven patterns and techniques, 3rd Edition - Randy Connolly and Ricardo Hoar, Fundamentals of Web Development

Haas, Andreas, Andreas Rossberg, Derek L. Schuff, Ben L. Titzer, Michael Holman, Dan Gohman, Luke Wagner, Alon Zakai, and J. F. Bastien. "Bringing the web up to speed with WebAssembly." In Proceedings of the 38th ACM SIGPLAN Conference on Programming Language Design and Implementation, pp. 185-200. 2017. Harvard

CSIS-E3 - Digital Marketing

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Digital Marketing
Course id: CSIS-E3
Type: Elective
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS118/

Activities

Lectures (Theory): 2

Lab lectures: 4
ECTS credits: 6

Learning Outcomes

The course aims to convey to students the basic principles of marketing and how modern technologies shape digital marketing. Emphasis is placed on the design and evaluation of digital products and services and the development of a digital marketing plan. Upon successful completion of the course, students will have acquired the following basic knowledge, skills and abilities: Understanding the concept and importance of marketing, digital marketing and its modern channels of application Understanding digital products and services and their business models Understanding and analyzing the marketing mix of e-services Marketing mix analysis and SWOT analysis for digital products and services Implementing relationship marketing and using appropriate practices for customer conversion marketing funnel and e-marketing funnel Application of methods for the establishment and evaluation of customer loyalty Application of branding practices Implementation and evaluation of digital marketing practices Creation of digital products and services through assessment and validation of alternative ideas Designing online / mobile applications for digital products / services Constructing a marketing plan for digital products and services Product / service evaluation, and implementation of product / service improvement and market expansion practices

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Decision Making, Independent work, Team work, Project design and management, Promoting free, creative and deductive reasoning

Course Content

The course is structured in twelve basic sections: Section 1: Introduction (Introduction to the Content of the Course, Basic Concepts) Section 2: Digital Economy (Definition and Characteristics of the Digital Economy, Impact of the Digital Economy in Greece / Europe / Worldwide) Section 3: Marketing Mix SWOT Analysis (Marketing Mix / 4P 7P Marketing mix, SWOT Analysis, Practical Application and Utilization of Marketing Mix SWOT in the context of Digital Marketing) Section 4: Product/Service Selection (Marketing of Services vs. Products, Product/Service Selection, Innovation Management, Product Technology Life Cycle, Product/Service Idea Evaluation, Emerging New Technologies Trends) Section 5: Business Models Digital Marketing (Basic Elements of e-Business Models, Types of e-Business Business Models, Multichannel Omnichannel Marketing) Section 6: Customer Loyalty (Concept and Importance of Customer Loyalty, Quality - Value - Loyalty Chain, Customer Conversion Process, Customer Loyalty Building Evaluation) Section 7: Branding (Introduction to Branding, Branding in Practice, Digital Branding, Examples of Successful Branding, Branding in Greece) Section 8: Digital Online Marketing Strategy (Business Strategy and e-Commerce, Frameworks for Defining Online Marketing Strategy) Section 9: Digital Marketing in Practice Marketing Plan (Online Marketing Tools, Building Implementing an Online Marketing Strategy, Evaluation of

Online Marketing Effectiveness, e-Marketing SWOT, Structure Content of Marketing Plan) Section 10: Marketing 4.0, e-Commerce Website Design, Development and Construction of e-shops, Legal Framework for Digital Marketing Section 11: Modern Trends in Digital Marketing Case Studies Section 12: Marketing Digital Marketing in Times of Crisis

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	22
Lab exercises	4
Thesis	70
Independent Study	54
Total	**150**

Assessment

Written examination Individual or group work

Literature

1. Laudon, K. C. and Traver, G.C., E-commerce, 14th Edition, Pearson, 2018. 2. Chaffey, D. and Ellis-Chadwick, F., Digital Marketing: strategy, implementation and practice, 7th Ed., Pearson, 2019 3. Kotler, P., Kartajaya, H., and Setiawan, I., Marketing 4.0: Moving from Traditional to Digital, Wiley, 2016 4. Strauss, J. and Frost, R., E-Marketing, 8th Ed., Routledge, 2018.

Journal of Marketing Marketing Science Electronic Commerce Research Electronic Markets

CSIS-E4 - Business Process Management

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Business Process Management
Course id: CSIS-E4

Type: Elective
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS129/

Activities

Lectures (Theory): 2
Lab lectures: 8
ECTS credits: 6

Learning Outcomes

The objectives of the course include the introduction of students to: the basic concepts of business process management BPM, the advantages of processes automation and digital transformation, as well as established business process modeling languages such as BPMN and CMMN. Students get familiar with modeling and management of both structured and standardized processes structured business processes and unstructured, human-centric processes knowledge-intensive processes. Upon successful completion of the course, students will have gained the following basic knowledge, skills and abilities: Understanding theories and methodologies for the management, modeling, evaluation and automation of business processes BPs. Familiarity with business process management systems and technologies that improve / automate BPs. Understanding of As-Is business processes analysis in practice and of the transition to new improved, automated BPs To-Be. Quantitative / Qualitative analysis and evaluation of existing BPs in order to improve them. Proposing new, improved, innovative, automated BPs Evaluation of alternative proposals for the improvement of BPs Proposing the application of cutting-edge technologies for the improvement and automation of BPs. Usage of BP modeling notation for BP modeling Usage of CMMN modeling language for modeling unstructured BPs.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Decision Making, Independent work, Team work, Formulation of new research ideas

Course Content

The course consists of twelve modules: 1st Module: Introduction to Business Processes BPs, their key components and the BP management life cycle 2nd Module: BP Identification - Methods, case studies 3rd Module: Modeling and Transformation of BPs Modeling methodologies, Case studies of BP automation 4th Module: Business Process Modeling Notation BPMN - Basic Components / Symbols, models quality, examples 5th Module: BP modeling diagrams using BPMN - Using BP management software that applies BPMN 6th

Module: BP Management Systems BPMS - Architecture, Use, Benefits 7th Module: BP Analysis and Improvement - Metrics, BP analysis and evaluation methods 8th Module: Use of BP management software with BP Modeling Notation for modeling and execution of BPs with the purpose to improve them 9th Module: Agile BPs and Case management Module 10th: CMMN Case Management Modeling Notation language - Basic components / symbols and syntax rules, differences from BPMN, examples Module 11th: Use of BP management software with CMMN for modeling agile BPs Module 12th: BP transformation with state-of-the-art technologies IoT, Big Data Analytics κ.α. -Benefits, Challenges, case studies

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
χρήση e-class
χρήση εργαλείων μοντελοποίησης διαδικασιών
χρήση εργαλείου δημιουργίας παρουσιάσεων

Course Organization

Activity	Semester work load
Lectures	18
Lab exercises	8
Thesis	70
Independent Study	54
Total	**150**

Assessment

two group assignments
assignments presentation/ oral examination

Literature

Fundamentals of Business Process Management, Marlon Dumas, Marcello La Rosa, Jan Mendling and Hajo A. Reijers, Springer Verlag 2013. http://fundamentals-of-bpm.org
Business Process Management: Concepts, Languages, Architectures, 2nd edition, Weske Mathias, Springer-Verlag 2012.

Business Process Management

CSIS-E8 - Project Management

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Project Management
Course id: CSIS-E8
Type: Elective
Semester: 1
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS117/

Activities

Lectures (Theory): 2
Lab lectures: 8
ECTS credits: 6

Learning Outcomes

The students will be able to:

1. Describe the objective purposes and goals of project management and the PM² methodology.
2. Explain the relationship between projects, deliverables, outcomes, and benefits.
3. Explain the lifecycle of a project.
4. Explain the governance model of a project.
5. Present the various processes and their roles during different phases of a project.
Explain the necessity of using different standard management documents during various phases of a project's lifecycle.
6. Develop PM² artefacts and customize them according to the organization's and project's specific needs.
7. Monitor and control the project, ensuring that the predefined outcomes are achieved and established benefits are realized.
8. Apply the PM² methodology to IT projects they manage.
9. Recognize arguments that allow them to support the implementation of the methodology within their organization.
10. Develop collaborative skills useful for solving challenging problems.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies.
Adaptation in new conditions.
Decision Making.
Team work.
Project design and management.
Promoting reasoning and self improvement.
Promoting free, creative and deductive reasoning.

Course Content

The purpose of the course is to cultivate skills related to contemporary methods of designing, monitoring, executing, and managing projects. The reference methodology is the PM² Project Management Methodology, developed by the European Commission (https://ec.europa.eu/isa2/solutions/open-pm2_en), which has gained significant traction both within and outside Europe.

Within the scope of the course, the following aspects of project management will be analyzed:

1. Organizational strategy and projects
2. Project governance
3. Project lifecycle
4. Project execution processes (e.g., requirement management, risk, issues, change, quality management)
5. Standard management documents for smooth governance, monitoring, and control of projects.

The Structure of the Course follows:
Lecture 1: Presentation of the PM² methodology, introductory concepts, project lifecycle.
Lecture 2: Presentation of the project initiation phase and conducting a workshop on drafting a project initiation request.
Lecture 3: Presentation and workshop on the business case of the project.
Lecture 4: Presentation and workshop on drafting the project charter and stakeholder analysis.
Lecture 5: Presentation of the design phase and the project governance model. Workshop on developing a governance model.
Lecture 6: Presentation of the project work plan and workshop on structural analysis of the project.
Lecture 7: Presentation on project scheduling, constructing diagrams, and identifying the critical path. Workshop on creating the Gantt chart.
Lecture 8: Presentation on resource allocation, project cost estimation, and optimization. Workshop on project optimization.
Lecture 9: Presentation and workshop on risk and issue management.
Lecture 10: Presentation of the project execution phase and workshop on creating the project

progress report.
Lecture 11: Presentation and workshop on monitoring and controlling project processes, as well as the closing phase.
Lecture 12: Discussion and provision of advice for the exculpatory projects of the course. Gathering best practices and summarizing knowledge and lessons learned for the course.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies, open office/MS office, Zoom/ MS teams.

Course Organization

Activity	Semester work load
Lectures	18
Lab exercises	8
Thesis	74
Independent Study	50
Total	**150**

Assessment

The final grade of the course is calculated based on the below two aspects:

1. Group workshops during the lessons and participation score (via peer review): 40% of the final grade.
2. Final Exculpatory Project and participation score (via peer review): 60% of the final grade.

Literature

The educational material includes the following:

1. PM² methodology guide.
2. PM² artefacts.
3. Additional supportive material (lecture slides, etc.).
4. Other publications from the PM² Alliance.

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CSIS1-5 - Deep Learning

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Deep Learning
Course id: CSIS1-5
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS121/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Upon successful completiion of this course, students will have a grasp of the fundamentals around the theory and practical application of modern deep learning models. These will allow students to apply machine / deep learning techniques in a production environment, as well as to carry out research in relevant fields.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Promoting reasoning and self improvement
Promoting free, creative and deductive reasoning

Course Content

- Representation learning for signals - convolutional neural networks (CNN)
- Capacity control: Regularization, dropout and data augmentation
- Popular CNN architectures
- Word embeddings

- Data loading, preprocessing and training workflows in pytorch
- Recurrent neural networks (RNN) with emphasis on LSTM and GRU
- Attention mechanisms
- Transformer networks
- Generative models: GAN, VAE and Normalizing Flows
- Introduction to Reinforcement Learning
- DQN, A2C and PPO algorithms

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Ανάπτυξη λογισμικού σε γλώσσα Python με χρήση Numpy, Pandas και Pytorch. Χρήση προεκπαιδευμένων μοντέλων. Προετοιμασία δεδομένων και ανάπτυξη μοντέλου.

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	62
Independent Study	64
Total	**150**

Assessment

Individual student projects

Literature

- Aston Zhang et al. (2022), "Dive into Deep Learning", https://d2l.ai/
- Ian Goodfellow, Yoshua Bengio and Aaron Courville (2016), "Deep Learning" (2016), MIT Press https://www.deeplearningbook.org/
- Sutton, R. S., Barto, A. G. (2018). Reinforcement learning: An introduction. MIT press.

Περιοδικά (ενδεικτικά):

IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Neural Networks and Learning Systems
Expert Systems with Applications
Journal of Machine Learning Research
Machine Learning
Journal of Artificial Intelligence Research

Neural Computing and Applications
International Journal of Computer Vision
Engineering Applications of Artificial Intelligence

Συνέδρια (ενδεικτικά):

Neural Information Processing Systems (NeurIPS)
International Conference on Machine Learning (ICML)
International Conference on Learning Representations (ICLR)
AAAI Conference on Artificial Intelligence (AAAI)
Computer Vision and Pattern Recognition (CVPR)
International Conference on Computer Vision (ICCV)
International Joint Conference on Artificial Intelligence (IJCAI)
European Conference on Machine Learning (ECML)
Asian Conference on Machine Learning (ACML)

CSIS1-6 - Graphs and Network Analysis

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Graphs and Network Analysis
Course id: CSIS1-6
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS124/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

Students will acquire a comprehensive understanding of fundamental graph theory concepts, network metrics, and advanced algorithms applied to real-world scenarios. By delving into topics such as degree centrality, eigenvector centrality, and community detection, students will

develop a robust skill set in graph analysis and visualization. The course not only equips students with the ability to represent complex systems as graphs but also enables them to utilize cutting-edge tools and methodologies for problem-solving. Furthermore, the exploration of applications, including social networks and pharmacology, ensures that students gain practical insights into diverse fields. Upon completion, graduates will possess a refined capacity to analyze, model, and interpret intricate relationships within networks, fostering their competence in research, industry, and various interdisciplinary domains. The profound impact of this course is expected to extend beyond academic realms, empowering students with a skill set highly sought after in today's data-driven and interconnected world.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Decision Making
Independent work
Team work
Promoting free, creative and deductive reasoning

Course Content

Introduction to graphs. Basic definitions. Paths, cycles, shortest paths.
Representation of graphs and toolbox of problems/algorithms on graphs.
Overview of basic concepts of graph theory. Introduction to network analysis metrics.
Degree centrality, eigenvector centrality, Katz centrality. Pagerank and HITS. Co-citation and bibliographic coupling networks. Closeness centrality, Betweenness centrality.
Node groups. Transitivity. Reciprocity. Signed graphs. Node similarity. Homophily.
The Internet as a graph. Properties of networks in the real world. Gnp and Gnm models. Small-world model. Power-law and scale-free networks. Barabasi-Albert model. R-MAT model.
Study of degree distributions in real graphs. Finding power-law exponents in power-law distributions. Generating graphs with realistic characteristics.
Link prediction in graphs.
Community detection in graphs.
Shallow methods for knowledge representation vector generation (graph embeddings).
Message-passing methods.
Graph Neural Networks.
Applications (social networks, pharmacology, and others).

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	64
Independent Study	60
Total	**150**

Assessment

I. Written exam 60% which includes:
- Multiple choice questions
- Solving problems using Python
- Comparative evaluation

II. Exercises 40%

Literature

- Network Science, Albert Laszlo Barabasi, 2022, Complete preprint on-line at http://networksciencebook.com/
- Networks: An introduction. Mark Newman. Oxford University Press, 2010.
- Graph Representation Learning. William L. Hamilton. Morgan Claypool. https://www.cs.mcgill.ca/~wlh/grl_book/

Journal of Graph Algorithms and Applications. http://jgaa.info ISSN: 1526-1719

CSIS2-4 - Cloud Native Applications Design

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Cloud Native Applications Design
Course id: CSIS2-4
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS120/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

The purpose is to understand the specifics of creating applications adapted to Cloud Computing as well as various types of services. The course focuses on understanding design patterns that enable the creation of applications with inherent abilities to adapt to distributed and dynamic environments. In addition it focuses on managing the code and development of these applications. Through this process students will be able to create applications that can automatically adapt (scaling and de-scaling) to dynamic operating conditions, have increased reliability and faster development and implementation.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Team work
Promoting free, creative and deductive reasoning

Course Content

Application level design patterns (e.g. state management, logging, dynamic discovery etc) , Microservices patterns, DevOps management of application code, application elasticity models/controllers, configuration management, versioning, deployment automation testing

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Eclass

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	58
Independent Study	66
Total	**150**

Assessment

Semester project assignment

Literature

1. Boris Scholl, Trent Swanson Peter Jausovec, Cloud Native-Using Containers, Functions, and Data
to Build Next-Generation Applications, O'Reilly

2. Cornelia Davis, Cloud Native Patterns, 2019, Manning Publications

IEEE Transactions on Services Computing
FGCS
IEEE Transactions on Cloud Computing
Elsevier Journal of Systems and Software

CSIS2-5 - Edge and Cloud management of Software-Defined Networks

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Edge and Cloud management of Software-Defined Networks
Course id: CSIS2-5
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS109/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Upon completion of this course, students will be acquainted with cutting-edge knowledge on networking technologies, principles, and concepts. They will understand how edge and fog computing can be used as enablers towards designing distributed computing systems and services closer to the end-users. The course also covers 5G/6G network architectures and massive IoT systems, helping students understand not only the fundamental elements, but also the services and applications available in this ecosystem. Moreover, the course includes Network Functions Virtualization (NFV) Management and Orchestration (MANO) and Software-Defined Networking (SDN) applications for cloud environments, providing expertise in dynamic resource provisioning, traffic engineering, load balancing, service chaining, and Quality of Service (QoS) / Experience (QoE) management. Furthermore, issues related to Content Distribution Networks (CDNs), networking for containerized applications, monitoring of cloud networks, and intent-based management are expected to help students build up their knowledge on advanced topics in the evolving field of networking technologies.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Independent work, Work at an interdisciplinary framework, Formulation of new research ideas

Course Content

- Edge and fog computing architectures and applications
- 5G/6G networks and massive IoT
- Dynamic network slicing
- Network Functions Virtualization (NFV) Management and Orchestration (MANO)
- Software-Defined Networking (SDN) applications in cloud environments: dynamic resource provisioning, traffic engineering, load balancing, service chaining, Quality of Service and Experience management
- Content Distribution Networks (CDNs)
- Networking for containerized applications
- Cloud networks’ monitoring
- Network applications examples
- Intent-based management

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Eclass

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	64
Independent Study	60
Total	**150**

Assessment

Personal assignment: 30%
Written exam: 70%

Literature

- "Towards Sustainable and Trustworthy 6G: Challenges, Enablers, and Architectural Design" ISBN: 978-1-63828-239-6
- "Fog and Edge Computing: Principles and Paradigms" ISBN: 9781119525066
- "Broadband Communications, Computing, and Control for Ubiquitous Intelligence" ISBN: 978-3-030-98064-1
- "Network Function Virtualization: Concepts and Applicability in 5G Networks" ISBN: 9781119390633
- "Network Functions Virtualization (NFV) with a Touch of SDN" ISBN: 978-0134463056
- "Network Programmability and Automation" ISBN: 9781098110833

IEEE Communications Surveys Tutorials
IEEE/ACM Transactions on Networking
IEEE Transactions on Network and Service Management
IEEE Internet of Things Journal
IEEE Transactions on Vehicular Technology
Wiley International Journal of Network Management
Springer Journal of Network and Systems Management
Elsevier Future Generation Computer Systems

CSIS2-6 - Cybersecurity

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Cybersecurity

Course id: CSIS2-6
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS113/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Familiarization with the systems security culture.
Training in basic security techniques.
Presentation of modern network vulnerabilities.
Specialty in security protection mechanisms.
Preparation and presentation of a security project in collaboration with other colleagues.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Team work

Course Content

Conceptual Foundation of Information and Communication Systems Security Terms
Applied Cryptography
Information security management and development of policies and procedures
Legal and regulatory framework for cybersecurity and privacy
Incident management - crisis management
Identity management systems and user access control
Data protection
Network Security
Detection and prevention of threats

Learning and Teaching Methods - Evaluation

Teaching methods: On site

Use of ICT:
eclass

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	80
Independent Study	44
Total	**150**

Assessment

Team project
Written exam

Literature

Ross Anderson. Security Engineering: A Guide to Building Dependable Distributed Systems, 3rd Edition
White papers and reports

International Journal of Information Security, Springer ACM Transactions on Privacy and Security

CSIS3-4 - Digital Transformation Innvovation Technologies

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Digital Transformation Innvovation Technologies
Course id: CSIS3-4
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS128/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

Solution Architecture for Digital Transformation, Incremental and on-going Digital Transformation Implementation Plan, Lifecycle Success Factors, Deliverables Evaluation, Digital Transformation Governance

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Team work
Work at an interdisciplinary framework
Formulation of new research ideas

Course Content

1. Concepts and Definitions of Digital Transformation
2. Business and Digital Transformation
3. Innovative and Disruptive Technologies and Digital Transformation
4. Study and analysis of innovative technologies
5. Critical Success Factors in Digital Transformation initiatives
6. Digital Transformation performance and evaluation indicators
7. Life cycle and deliverables in Digital Transformation
8. Market sectors and Digital Transformation
9. Industry Disruption and Disruptive Technologies
10. Digital Transformation Execution Plan
11. Business change management
12. Case Studies by Market Sector

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eClass, case studies, case tools

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	50
Independent Study	74
Total	**150**

Assessment

2 assignment projects

Literature

The Digital Future
Digital Transformation Strategy

Journal of Digital Transformation

CSIS3-5 - Supply Chain Management

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Supply Chain Management
Course id: CSIS3-5
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS125/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

The main objective of this course is to present the concepts, methods and applications of Supply Chain Management. Emphasis is placed on the use of information and communication technologies ICT for improving the processes and support decision-making in supply chain. Upon successful completion of the course, students will have acquired the following basic knowledge, skills and abilities: Understanding the basic processes, objectives and cost factors in supply chain management Understanding the importance of creating value for the customer and providing rich customer experience Understanding warehouse management processes and systems and the benefits of automation / robotics solutions Understanding and evaluating the benefits of applying ICT to the supply chain Proposing ICT-enabled solutions for supply chain to improve decision-making and solve persistent problems. Understanding supply chain distribution strategies Apply and evaluate alternative forecasting models in the supply chain Understand the role of inventory in the supply chain and the inventory models Compute orders based on demand forecasting and the adequate inventory model Select inventory management strategies in the supply chain Proposing IoT Internet of Things-enabled solutions for supply chain challenges Proposing business analytics applications for supply chain challenges Understanding of sustainability practices and their importance to supply chain

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Decision Making, Formulation of new research ideas

Course Content

The course is structured in twelve basic modules: 1st Module: Introduction to the basic concepts of supply chain management 2nd Module: Basic functions / processes of the supply chain, Strategic planning, Key performance indicators KPIs 3rd Module: Customer service, Quality of service, Value creation for the customer 4th Module: Warehouse Management praocesses, storage organization practices and factors 5th Module: Warehouse Management - warehouse management systems, robotics and automation applications 6th Module: Information systems in supply chain management 7th Section: Supply Chain Distribution Strategies pros and cons, case studies 8th Section: Demand Forecasting in supply chain - alternative forecasting models, metrics evaluation 9th Section: Inventory Management - Inventory types, costs and models, 10th Section: Using IoT Internet of Things Technologies in the Value Chain - case studies Industry 4.0 11th Section: Using Business Analytics to enhance supply chain management - case studies 12th Section: Sustainable value chain - case studies

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
χρήση e-class
χρήση εργαλείων δημιουργίας παρουσιάσεων

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	56
Independent Study	68
Total	**150**

Assessment

exams 65% assignment 35%

Literature

- Logistics and Supply Chain Management 5th Edition, Christopher M., Pearson, 2016 - Supply Chain Management 5th Edition, Chopra, S. and Meindl, P., Pearson, 2013

Production and Operations Management
Supply Chain Management
International Journal of Production Economics

CSIS3-6 - Technology Economics Investment Valuation

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Technology Economics Investment Valuation
Course id: CSIS3-6
Type: Obligatory
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS111/

Activities

Lectures (Theory): 2
Lab lectures: 0

ECTS credits: 6

Learning Outcomes

The course concerns the development of a systematic methodology for the necessary subject of investment appraisal and techno-economic analysis for a new project, as well as for the conversion, improvement or extension of an existing one, with reference to the field of Information and Communication Technologies (ICT).
More specifically, the course aims to:
- Help students to gain a supervisory overview of a techno-economic analysis, presenting its basic principles and stages, as well as typical examples of its application.
- Analyze the major components of a techno-economic study, such as cost estimation, market, competition, risk, etc.
- Present the basic principles of developing business plans in the high-tech market, and enable their practical application; to present the financial figures and management accounting methods for evaluating and valuing investments, as well as the basic principles of risk and risk analysis.
- Describe the main methodologies for forecasting demand and competition in the ICT market.
- Present principles and the most important methodologies applied for costing and pricing of products and services.

General Skills

Independent work, Team work, Work at an interdisciplinary framework, Project design and management, Promoting reasoning and self improvement

Course Content

ii. Technoeconomic analysis – basic principles and stages
iii. Business plans: main principles, stages for the construction of successful business plans.
iv. SWOT – PEST analyses.
v. Diffusion of products and services in markets – market competition
vi. User behaviour and evaluation of preferences – Movement of users among providers – substitution of technological generations etc.
vii. Investments, investment portfolio analysis portfolio
viii. Key economic quantities such as Net Present Value - NPV, Internal rate of return - IRR, Project Payback Period, Investments, Operating Costs, Cash Flow, Income, Depreciation, etc.
ix. Risk analysis
x. Uncertainty in market parameters and cost parameters (market size, market share, technology evolution, cost evolution)
xi. Costing of products and services. Costing methodologies and models for networks and services.
xii. Historical cost and fully distributed costing. Indirect, direct, common and associated cost, Critical costing factors.
xiii. Pricing: Standards for pricing telecommunications services. Pricing methodologies

based on cost, demand and competition.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
e-class

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	60
Independent Study	64
Total	**150**

Assessment

- Presentation
- Written report

Literature

-Investment Analysis and Portfolio Management, D. Vassiliou, N. Iriotis -Production systems management, Dimitriadis Sotirios G., Michiotis Athanasios N. -Financial Investment Analysis, Panagiotis Fotis

1. Ανάλυση Επενδύσεων και Διαχείριση Χαρτοφυλακίου Δ. Βασιλείου, Ν. Ηρειώτης, ISBN: 978-960-7745-22-4, Μ.ΤΖΩΡΤΖΑΚΗΣ ΚΑΙ ΣΙΑ Ε.Ε.
2. Αξιολόγηση Επενδύσεων, Έκδοση: ΔΕΥΤΕΡΗ/2010, Πετράκης Παναγιώτης, ISBN: 978-960-99388-1-5, QUAESTOR ΜΟΝΟΠΡΟΣΩΠΗ Ε.Π.Ε.

CSIS-E1 - Knowledge Representation and Reasoning

General Information

School: Digital Technology
Department: Informatics and Telematics

Level: Postgraduate
Course Title: Knowledge Representation and Reasoning
Course id: CSIS-E1
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS103/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

Upon successful completion students will be able to
- Describe the foundational concepts of knowledge representation
- Model knowledge representation problems as search problems, constraint satisfaction problems, and answer set programs.
- Understand the structure of Semantic Web and its basic tools.

General Skills

- Search, analysis and synthesis of data and information with the use of the assorted technologies
- Independent work
- Adaptation in new conditions
- Promoting free, creative and deductive reasoning

Course Content

1. Introduction to propositional and first-order logic: truth assignments, logical consequence, satisfiability, tautologies and contradictions, proof procedures, resolution, canonical forms, quantification, interpretations, substitution, unification.
2. Logic programs: facts, rules, queries, recursion, compound terms, non-deterministic programming, generate-and-test, search.
3. Incomplete knowledge: non-monotonic reasoning, negation-as-failure, answer-set programming, integrity constraints, modeling of hard problems, planning.
4. Semantic Web: data integration, meaning of symbols, RDF
5. Reasoning in Semantic Web: ontologies, OWL 2, description logics, inference algorithms for description logics.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	74
Independent Study	50
Total	**150**

Assessment

Individual or team assignments.

Literature

- Brachman and Levesque, Knowledge Representation and Reasoning, Morgan Kaufmann, 2004, ISBN: 1-55860-932-6
- Gelfond and Kahl, Knowledge Representation, Reasoning, and the Design of Intelligent Agents: The Answer-Set Programming Approach, Cambridge University Press, 2014, ISBN: 978-1-107-02956-9.
- Bratko, Prolog programming for artificial intelligence. Addison-Wesley, 1986. ISBN: 978-0-201-14224-2.
- Frank van Harmelen, Vladimir Lifschitz, and Bruce Porter. 2007. Handbook of Knowledge Representation. Elsevier Science, San Diego, USA.

- International Conference of Knowledge Representation and Reasoning (KRR)
- International Joint Conference on Artificial Intelligence (IJCAI)
- International Conference on Semantic Web (ISWC)
- ACM Transactions on Computational Logic (ACM TOCL)
- Theory and Practice of Logic Programming (TPLP)
- Journal of Artificial Intelligence
- International Journal of Approximate Reasoning (IJAR)

CSIS-E11 - Computer Vision

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Computer Vision
Course id: CSIS-E11
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS102/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

- Adoption of basic principles of image analysis and computer vision
- Understanding fundamental methodologies for image transformation and optimization
- Analysis of spatial segmentation and edge detection methods
- Understanding of basic methodologies for feature extraction
- Adoption of computer vision methodologies using deep learning techniques

General Skills

- Search, analysis and synthesis of data and information with the use of the assorted technologies
- Decision making
- Individual work
- Project design and management
- Promoting reasoning and self-improvement
- Promoting free, creative and deductive reasoning

Course Content

Week 1: Introduction to the course
Week 2: Transformations
Week 3: Optimization
Week 4: Course lab (1)
Week 5: Segmentation
Week 6: Edge detection
Week 7: Feature Extraction
Week 8: Course lab (2)
Week 9: Introduction to deep learning techniques for computer vision
Week 10: Computer vision applications using deep learning techniques (1)
Week 11: Computer vision applications using deep learning techniques (2)
Week 12: Course lab (3)

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Τρόπος Παρακολούθησης: Διαλέξεις, παρουσιάσεις σε powerpoint, παρακολούθηση εργαστηρίων, επικοινωνία και επίλυση αποριών δια ζώσης, παροχή σύγχρονης σχετικής βιβλιογραφίας
Χρήση Τεχνολογιων Πληροφορίας και Επικοινωνιών: επικοινωνία με e-mail, παροχή υλοποιημένων μεθόδων υπολογιστικής όρασης

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	56
Independent Study	68
Total	**150**

Assessment

- Project: Design and development of various digital image processing algorithms.
- (Optional) Written or oral exam: Development and multiple choice questions.

Literature

- N. Papamarkos, Digital processing and analysis of image , Giourdas Eds., 2005, in Greek.
- Richard Szeliski, «Computer Vision: Algorithms and Applications (Texts in Computer Science) 2nd ed.», 2022 Edition
- Voulodimos, Athanasios, et al. “Deep learning for computer vision: A brief review." Computational intelligence and neuroscience 2018 (2018).

- Voulodimos, Athanasios, et al. “Deep learning for computer vision: A brief review." Computational intelligence and neuroscience 2018 (2018).

CSIS-E5 - Applications of Data Science and Artificial Intelligence

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Applications of Data Science and Artificial Intelligence
Course id: CSIS-E5
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS106/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

Comprehensive Understanding of the foundational concepts, principles, and theories underlying data science and artificial intelligence.
Technical proficiency in implementing and applying various machine learning algorithms, data preprocessing techniques, and advanced analytics tools.
Problem-Solving Skills in analyzing complex problems and design effective solutions using data-driven and AI approaches.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Social, work-related and ethical responsibility in matters related to gender equality.

Course Content

Foundations of Data Science and AI
Machine Learning Algorithms
Advanced Machine Learning
Big Data Technologies
Natural Language Processing (NLP)
Computer Vision
Ethical and Legal Aspects
Data Engineering
AI Applications in Industry
Research Methods in Data Science and AI
Emerging Trends in Data Science and AI

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
email, e-class, Περιβάλλοντα ανάπτυξης κώδικα, Προηγμένες βιβλιοθήκες λογισμικού

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	56
Independent Study	68
Total	**150**

Assessment

Capstone project

Literature

Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach (3rd Edition)
John Paul Mueller and Luca Massaron, Machine Learning for Dummies
M. Tim Jones, AI Application Programming (Programming Series) 2nd Edition

Engineering Applications of Artificial Intelligence
The Journal of Machine Learning Research
Artificial Intelligence Review An International Science and Engineering Journal, Springer
IEEE Transactions on Artificial Intelligence
Taylor Francis, Applied Artificial Intelligence

CSIS-E6 - Cloud Systems Design

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Cloud Systems Design
Course id: CSIS-E6
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS112/

Activities

Lectures (Theory): 2
Lab lectures: 10
ECTS credits: 6

Learning Outcomes

Completing the course students would be prepared to act as cloud architects having the necessary knowledge to:

- Designing, developing and deploying cloud-based systems
- Evaluating and identifying optimal cloud solutions in collaboration with engineering and development teams
- Educating teams about implementing new technologies and initiatives related to cloud computing
- Achieving best practices in cloud development and maintenance

- Providing cloud support to clients and make recommendations based on their needs

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Team work
Promoting reasoning and self improvement
Promoting free, creative and deductive reasoning

Course Content

The course aims at the design of cloud systems integrating cloud services and products. To accomplish this, students shall lean how to combine technological and business requirements and available cloud products. The course consists of the following parts:
a) Cloud models (IaaS, PaaS, CaaS, SaaS) and available products and services. Functional and non-functional characteristics, pricing policies. Synthesis of a cloud solution
b) Managing technological and business requirements. Selection criteria between different cloud products and services
c) Complex design problems, cloud migration strategies, multi-cloud solution design, migration and maintenance cost as a design criterion, edge system design, multilayer cloud-edge solutions, AI in cloud system design

The course includes laboratory lessons based on Amazon platform, Amazon Cloud and Web Service MarketPlace. Cloud system design and cloud solution synthesis is based on case studies based on existing business systems.

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Στο μάθημα αξιοποιούνται όλα τα ηλεκτρονικά εργαλεία για τη διαχείριση και παρακολούθηση του μαθήματος που προσφέρονται από το Πανεπιστήμιο (eclass, zoom, κλπ). Οι διαλέξεις και τα εργαστήρια θα είναι επίσης διαθέσιμη σε ηλεκτρονική μορφή.
Για το εργαστήριο του μαθήματος θα χρησιμοποιηθεί η πλατφόρμα και τα εργαλεία του Amazon Cloud and Web Service Marketplace.

Course Organization

Activity	Semester work load
Lectures	16
Lab exercises	10
Thesis	70
Independent Study	54
Total	**150**

Assessment

The final rate of the course is computed based on two group projects, each one with a different scope. Groups consists of 2-3 persons. The first project focuses on the full design of a case study and contributes 65%-70% of the final grade. The second project explores advanced features and contributes 35%-30% of the final grade. Each project consist of individual deliverables submitted throughout the semester period as the course progress over time.

A total rate of 6 (scale 1-10) is required to pass the course, while a rate of 6 is also required individually for each of the two projects. Projects should be timely submitted and presented at the end of the semester. Projects not presented are not considered as submitted and can not be rated. Rating is performed per student individually and not per project.

Literature

https://link.springer.com/content/pdf/10.1007/978-3-319-77839-6.pdf

https://link.springer.com/content/pdf/10.1007/978-3-319-51310-2.pdf

https://docs.aws.amazon.com/prescriptive-guidance/latest/cloud-design-patterns/introduction.html

additional material will be provided through e-class platform

IEEE Transactions on Cloud Computing
Future Generation Computer Systems, Elservier
Cloud Computing, Springer

CSIS-E7 - Innovation and Enterpreneurship

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Innovation and Enterpreneurship
Course id: CSIS-E7
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS119/

Activities

Lectures (Theory): 2
Lab lectures: 0
ECTS credits: 6

Learning Outcomes

Understanding the concept and importance of entrepreneurship and innovation as well as the environment in which they develop Understanding the contribution of emerging information and communication technologies to enable innovative business initiatives, Understanding the process of innovation and creativity, Understanding alternative types of innovation, patenting methods and valuation models of business plans, Understanding the process of business plan formulation: o conception of a business idea, o exploration of the business environment, o business model development, o preparation of a business plan, o finding resources, o Exploring exit strategies. Understanding the sources of funding at all stages with emphasis on venture capital funds. Understanding the search, analysis and synthesis of information that identifies the attractiveness of a sector or market. Understanding the usage of tools that capture the internal and external business environment. Gaining the ability to formulate a complete business plan for an innovative business concept.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies, Adaptation in new conditions, Decision Making, Independent work, Team work, Formulation of new research ideas

Course Content

Introduction to the course - Introduction to Entrepreneurship Digital Innovation Business Opportunity Recognition Business Model Development Writing Evaluating a Business Plan Market Analysis, Competition Marketing Plan Innovation Ecosystem Workshop for Business Idea Generation Developing FinTech Business Models - The FinTech Ecosystem and Findings from Innovation Centers / Incubators Introduction to Blockchain technology - examples and case studies Start-ups based on IoT applications Financing support of Start-ups Workshop for creating a business plan

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
eclass, estudies

Course Organization

Activity	Semester work load
Lectures	26
Lab exercises	0
Thesis	44
Independent Study	80
Total	**150**

Assessment

individual assignment for developing a startup business model and teamwork assignment for start up digital business model development

Literature

1.J. Bessant J. -Tidd J., Κουλουριώτης Δημήτρης επιμ., Καινοτομία και Επιχειρηματικότητα, 3η έκδοση, Εκδόσεις Τζιόλα, 2016. 2.Kuratko F. Donald, Επιμέλεια Έκδοσης Φαφαλιού Ειρήνη, Επιχειρηματικότητα-Από τη Θεωρία στην Πράξη, Εκδόσεις Broken Hill Publishers, 2018. 3.Α. Πατέλη, Καινοτομία Επιχειρηματικότητα στις Ανθρωπιστικές και Κοινωνικές Επιστήμες, Εκδόσεις ΕΛΚΕ ΙΠ Δράση ΜοΚΕ Ι.Π., 2014. 4.Η. Γ. Καραγιάννης, Ι. Λ. Μπακούρος, Καινοτομία Επιχειρηματικότητα: Θεωρία Πράξη, Εκδόσεις Σοφία, 2010

Journal of innovation and entrepreneurship

CSIS-E9 - Advanced Topics in Cloud and Edge/IoT Systems

General Information

School: Digital Technology
Department: Informatics and Telematics
Level: Postgraduate
Course Title: Advanced Topics in Cloud and Edge/IoT Systems
Course id: CSIS-E9
Type: Elective
Semester: 2
Teaching and Examination Language: Greek
Is the course offered in Erasmus: NO
Course web-page: https://eclass.hua.gr/courses/CSIS107/

Activities

Lectures (Theory): 2
Lab lectures: 12
ECTS credits: 6

Learning Outcomes

This particular course aims to highlight the upcoming rapid developments in the field of cloud and edge/IoT systems, wanting to spark students' interest in future and emerging directions. In this context, it also acts as an introduction to the thesis stage, trying to be a source of inspiration for combining the technologies that the students have been taught in the context of a comprehensive topic for the thesis. It aims to strengthen the prospects of the specific program towards innovation but also to create potential research stimuli that will subsequently strengthen the doctoral studies program of the department.

General Skills

Search, analysis and synthesis of data and information with the use of the assorted technologies
Adaptation in new conditions
Decision Making
Independent work
Formulation of new research ideas
Promoting free, creative and deductive reasoning

Course Content

Lectures on selected cutting-edge topics with targeted presentations on the application of technologies. Indicative topics:
1. Advanced topics of software-based programmable networks
2. Advanced IoT topics
3. Resource management in the Cloud-edge continuum
4. Applying AI to the Edge

Learning and Teaching Methods - Evaluation

Teaching methods: On site
Use of ICT:
Eclass

Course Organization

Activity	Semester work load
Lectures	14
Lab exercises	12
Thesis	70
Independent Study	54
Total	**150**

Assessment

Semester Project Assignment

Literature

ACM COMPUTING SURVEYS
IEEE Access

Elsevier Future Generation Computer Systems
IEEE Transactions on Systems, Man, and Cybernetics
IEEE Communications Surveys Tutorials
IEEE/ACM Transactions on Networking
IEEE Transactions on Network and Service Management
IEEE Internet of Things Journal
IEEE Transactions on Vehicular Technology