Co-funded by the Erasmus+ Programme of the European Union

MUBS

ELEGANT

WP3 Improving the Human Capacities of University Staff and Revise/Upgrade the ICT Curricula in Partner Universities

Modern University for Business and Science (M.U.B.S) – Lebanon

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Bachelor Program Overview

The computer science undergraduate program, leading to a Bachelor of Science degree, is designed to enable students to:

- Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

The program requirements are 94 semester credits hours divided as 21 credits General Education Requirements (including 3 Electives), 42 credits Computer core courses, 6 major elective courses and 21 credits computer major courses in addition to 4 credits for the internship and senior project. Each course in the program (including the senior project) is valued as 3 credits (equivalent to 6 ECTS).

The language of instruction in all courses at the computer science program is English. The average class size in all computer science courses is 15 students.

MUBS Curriculum Update – Bachelor Level

MUBS plan for the ELEGANT WP3 was based on the following framework:

***Adding the following courses:**

1. Introduction to Cybersecurity
2. Introduction to Data Science and AI
3. Cloud Computing and Big Data
4. Sustainable employability skills

***Enhancing/modifying the following courses:**

5. Programming I
6. Database systems

7. Mobile Application Development
8. Web Programming (New Course Title: Web Client Programming)
9. Object Oriented Programming (New Course Title: Advanced Java Programming)
10. Python Programming (New Course Title: Python for Data Science)

Course: CSC331 Introduction to Cybersecurity

Session:

Office Hours:

Textbook: Computer Security Fundamentals, 4th Ed, C. Easttom, Pearson (2019).

Instructor:

Email:

Course Description:

This course provides an exploratory study of cybersecurity concepts, principles, and technologies. Major topics covered include cyber threats and vulnerabilities, information security frameworks, network infrastructure security, wireless network security, cryptography, defense-in-depth security strategy, information security policy, and security management. The goal is to establish a basis for further study in cybersecurity.

Course Objectives:

The main objective of the course is to teach students the fundamental concepts of cybersecurity and how to defend against cyberattacks. In addition, the student will acquire the capability to identify and classify various cyber defense tools based on their security mechanisms and application domains. The students will learn the best cybersecurity practices that should be applied to detect and thwart each type of cyberattacks. Another objective is to teach students the various types of symmetric and asymmetric algorithms that are used in encryption schemas. Finally, the course aims to teach students how to implement secure software and hardware architectures and infrastructures.

Learning Outcomes:

Upon completion of this course, the student should be able to:

1. Inspect and recognize threat agents and malicious actors to digital systems including those implicated in cyberterrorism and industrial espionage.

2. Explore defense-in-depth and its relationship with the protocols at the various layers of the OSI model.
3. Explain the concepts of cyber defense and establish the corresponding practical implementation approaches.
4. Develop and infer how to employ tools and techniques to best defend against a cyberattack.
5. Investigate the countermeasures and mitigations that should be applied in case of a system compromise.
6. Understand the first bases of network security including security risk assessment.
7. Compare security methods and identify how to apply them in a network.
8. Compare and analyze various symmetric and asymmetric cryptography algorithms.
9. Explore the technologies and measures that are used to safeguard networks against security attacks and determine their implementation priorities.
10. Exploit and employ network monitoring software.

Grade Allocation:

Attendance = 5% Participation = 5% Assignement 1 = 5%

Assignement 2 = 5% Project = 20% Mid-Term Exam = 30%

Final Exam = 30%

Grading Scale:

97% - 100% = A+ 93% - 96% = A 90% - 92% = A-

87% - 89% = B+ 83% - 86% = B 80% - 82% = B-

77% - 79% = C+ 73% - 76% = C 70% - 72% = C-

67% - 69% = D+ 63% - 66% = D 60% - 62% = D-

59% & below = F

Teaching Methods:

A. Presentation slides

B. Demonstrations

Course Plan:

Weeks	Topics	Tasks	Teaching Methods (Letters)
1	Introduction to the course Chapter 1 Introduction to Computer Security • Threats to Network Security • Identifying Types of Threats • Assessing the Likelihood of an Attack • Basic Security Terminology • The CIA Triangle • Online Security Resources		A, B
2	Chapter 2 Networks and the Internet • Network Basics • Network Elements • Types of Network Connections • Network Protocols • How the Internet Works • Basic Network Utilities • The OSI Model		A, B
3	Chapter 3 Cyber Stalking, Fraud, and Abuse • How Internet Fraud Works • Identity Theft • Cyber Stalking • Protecting Against Cybercrime		A, B

4	Chapter 4 Denial of Service Attacks • DoS Attacks • Illustrating an Attack • Tool Used for DoS Attack • Specific DoS Attacks • How to Defend Against DoS Attacks Chapter 5 Malware • Viruses • Trojan Horses • Buffer-Overflow Attack		A, B
5	Chapter 5 Malware (continued) • Spyware • Other Forms of Malware • Detecting and Eliminating Viruses and Spyware Chapter 6 Techniques Used by Hackers • Basic Terminology • The Reconnaissance Phase • Actual Attacks • Malware Creation • Penetration Testing • The Dark Web		A, B
6	Chapter 7 Industrial Espionage in Cyberspace • What Is Industrial Espionage? • Information as an Asset		A, B

	• Real-World Examples of Industrial Espionage • How Does Espionage Occur? • Protecting Against Industrial Espionage • Spear Phishing		
7	Chapter 8 Encryption • Cryptography Basics • History of Encryption • Modern Cryptography Methods • Public Key (Asymmetric) Encryption o RSA o PGP o Digital Signatures		A, B
8	Chapter 8 Encryption (continued) • Public Key (Asymmetric) Encryption o Hashing o MAC and HMAC o Steganography o Cryptanalysis o Quantum Computing Cryptography Exercises		A, B
9	Exercises Mid-Term Exam		A, B
10	Chapter 9 Computer Security Technology • Virus Scanners		A, B

	• Firewalls • Antispyware • Intrusion Detection System IDS • Digital Certificates • SSL/TLS • Virtual Private Networks • Wi-Fi Security		
11	Chapter 10 Security Policies • What Is a Policy? • Defining User Policies • Defining System Administration Policies • Defining Access Control • Standards, Guidelines, and Procedures • Disaster Recovery Exercises		A, B
12	Chapter 11 Network Scanning and Vulnerability Scanning • Basics of Assessing a System • Securing Computer Systems • Scanning Your Network • Getting Professional Help Exercises		A, B
13	Chapter 14 Introduction to Forensics • General Guidelines • Finding Evidence on the PC		A, B

	• Finding Evidence in System Logs • Mobile Forensics: Cell Phone Concepts • Additional Types of Forensics Exercises		
14	Exercises Final Revision		A, B

Classroom Policies:

Attendance:

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Course: CSC340 Introduction to Data Science and AI

Session:

Office Hours:

Textbook: The Data Science Design Manual, 1st Ed, S.S. Skiena, Springer (2018).

Instructor:

Email:

Course Description:

This course will start with the fundamental basis of data science, and will provide the student with the main tools and methods of data handling, experimental data analysis, data visualization, data extrapolation, and data-driven communication. The course will also teach the student the mathematical foundation, particularly in statistics and linear algebra, that each data scientist should acquire. The student gets to know the roots of Artificial Intelligence applications, such as Linear and Logistic Regression, Classification, and Clustering. Finally, the course introduces various programming languages and tools that are utilized in data science applications, such as Python, R, Perl, and Matlab.

Course Objectives:

This course will attempt to express the projected skills of data scientists and then supply the students with the capability to deliver against these expectations. Specifically, the students will obtain the skills that will enable them to incorporate data into their decision-making and analysis. The course will encourage the students to work closely with data and construct data-driven decisions in their study domains. The course also stimulates the student to discover the modern applications associated with big data and machine learning.

Learning Outcomes:

Upon successful completion of the course the student will be able to:

1. Describe the main types of problems and methodologies in data science and AI
2. Provide examples of data science and AI applications from various domains
3. Give illustrations of how stochastic models and machine learning (ML) are utilized in data science and AI

4. Explain the correlation between logical and data-driven machine learning-based techniques within AI.
5. Recognize suitable types of analysis problems for various data science applications
6. Justify which type of statistical model is relevant for the most familiar kinds of experiments in data science applications
7. Discuss the advantages and weaknesses of various types of methods and paradigms within data science and AI
8. Use the proper programming libraries and practices to employ basic transformations, visualizations, and analyses of sample data
9. Implement some types of stochastic models and apply them in data science and AI applications
10. Apply and use AI tools for searching, designing and problem solving

Grade Allocation:

Attendance = 5% Participation = 5% Assignement 1 = 5%

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Final Exam = 30%

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59% & below = F

Teaching Methods:

C. Presentation slides

D. Demonstrations

Course Plan:

Weeks	Topics	Tasks	Teaching Methods (Letters)
1	Introduction to the course Chapter 1 What is Data Science? • Data Science and Real Science • Asking Interesting Questions from Data • Datasets o The Baseball Encyclopedia o The Internet Movie Database (IMDb) o Google Ngrams o New York Taxi Records • Properties of Data • Classification and Regression		A, B
2	Chapter 2 Mathematical Preliminaries • Probability • Descriptive Statistics • Correlation Analysis • Logarithms Exercises Chapter 3 Data Munging • Languages for Data Science		A, B
3	Chapter 3 Data Munging (continued) • Collecting Data • Cleaning Data • Crowdsourcing Exercises		A, B

4	Chapter 4 Scores and Rankings • The Body Mass Index • Developing Scoring Systems • Z-scores and Normalization • Advanced Ranking Techniques • Arrow's Impossibility Theorem Exercises Chapter 5 Statistical Analysis • Statistical Distributions o The Binomial Distribution o The Normal Distribution		A, B
5	Chapter 5 Statistical Analysis (continued) • Statistical Distributions o Implications of the Normal Distribution o Poisson Distribution o Power Law Distributions • Sampling from Distributions • Statistical Significance • Permutation Tests and P-values • Bayesian Reasoning Exercises		A, B
6	Chapter 6 Visualizing Data • Exploratory Data Analysis • Developing a Visualization Aesthetic • Chart Types		A, B

	• Reading Graphs • Interactive Visualization Exercises		
7	Chapter 7 Mathematical Models • Philosophies of Modeling • A Taxonomy of Models • Baseline Models • Evaluating Models • Evaluation Environments • Simulation Models Exercises		A, B
8	Exercises Mid-Term Exam Revision		A, B
9	Chapter 8 Linear Algebra • The Power of Linear Algebra • Visualizing Matrix Operations • Factoring Matrices • Eigenvalues and Eigenvectors		A, B
10	Chapter 8 Linear Algebra (continued) • Eigenvalue Decomposition Exercises Chapter 9 Linear and Logistic Regression • Linear Regression • Better Regression Models • Regression as Parameter Fitting		A, B

11	Chapter 9 Linear and Logistic Regression (continued) • Simplifying Models through Regularization • Classification and Logistic Regression • Issues in Logistic Classification Exercises Chapter 10 Distance and Network Methods • Measuring Distances		A, B
12	Chapter 10 Distance and Network Methods (continued) • Nearest Neighbor Classification • Graphs, Networks, and Distances • PageRank • Clustering Exercises		A, B
13	Chapter 12 Big Data: Achieving Scale • What is Big Data? • Algorithmics for Big Data • Filtering and Sampling • Parallelism • MapReduce • Societal and Ethical Implications		A, B
14	Exercises Final Exam Revision		A, B

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Course: CSC341 Cloud Computing and Big Data

Session:

Office Hours:

Textbook: Cloud Computing: Theory and Practice, 2nd Edition, D. Marinescu, Morgan Kaufmann (2017)

References: [R1] Cloud Computing for Science and Engineering, 1st Edition, I. Foster & D. B. Gannon, The MIT Press Cambridge, Massachusetts (2017)

[R2] Cloud Computing: Concepts, Technology & Architecture, 1st edition, T. Erl; R. Puttini & Z. Mahmood, Pearson (2013)

Instructor:

Email:

Course Description:

This course aims to teach you the basics of cloud computing. It starts with an overview of cloud computing, covering what it is, what it can do, and how it is provided. The definition and main characteristics of cloud computing, as well as its history, cloud computing business cases, and new cloud-supporting technology use cases.

We introduce you to some of the most well-known service providers today and the services they provide. Storage services, cloud economy, level of hosting infrastructure, and cloud services will all be discussed. We will also study alternative cloud computing application scenarios and alternative hosting scenarios. You will learn about different cloud service models (IaaS, PaaS, SaaS), deployment models (public, private, hybrid), and key components of cloud infrastructure (VM, network, storage-files, blocks, objects, CDN). Hybrid multi-cloud, microservices, serverless, DevOps, cloud-native, and application modernization are the emerging cloud trends and methods covered. Moreover, we will compare different cloud systems and discuss the future of cloud computing.

In the last part of his course, you will learn about the characteristics of Big Data in the cloud and its application in Big Data Analytics. You will gain an understanding of the features, benefits, limitations, and applications of some of the Big Data processing tools. You'll explore how Hadoop and Hadoop-based databases help leverage the benefits of Big Data while overcoming some of the challenges it poses.

Course Objectives:

Upon the completion of this course, you will be able to

- Define cloud computing and explain the key characteristics, history, business principles, and emerging technologies of cloud computing.

- Explain the difference between cloud services and APIs, and how they relate to cloud computing.
- Describe cloud services (IaaS, SaaS, PaaS) and deployment options (public, private, hybrid) and infrastructure (VM, network, and storage).
- Describe the differences between hosting services and identify each one.
- Explain how hybrid multi-cloud, microservices, serverless, cloud-native, DevOps, and application modernization are all about developing cloud-related topics.
- Recognize the difference between cloud deployment models.
- Explain the V's of Big Data (volume, velocity, variety, veracity, valence, and value) and why each impacts data collection, monitoring, storage, analysis, and reporting.
- Get value out of Big Data by using a 5-step process to structure your analysis.
- Identify what are and what are not big data problems and be able to recast big data problems as data science questions.
- Explain the architectural components and programming models used for scalable big data analysis.
- Summarize the features and value of core Hadoop stack components including the YARN resource and job management system, the HDFS file system, and the MapReduce programming model.

Learning Outcomes:

Upon successful completion of the course the student will be able to:

1. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
2. Compare the advantages and disadvantages of various cloud computing platforms.
3. Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine.
4. Program data-intensive parallel applications in the cloud.
5. Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
6. Identify security and privacy issues in cloud computing
7. Explain recent research results in cloud computing and identify their pros and cons.
8. Solve a real-world problem using cloud computing through group collaboration.

Grade Allocation:

Attendance = 5% Participation = 5% Assignement 1 = 5%

Assignement 2 = 5% Project = 20% Mid-Term Exam = 30%

Final Exam = 30%

Grading Scale:

97% - 100% = A+ 93% - 96% = A 90% - 92% = A-

87% - 89% = B+ 83% - 86% = B 80% - 82% = B-

77% - 79% = C+ 73% - 76% = C 70% - 72% = C-

67% - 69% = D+ 63% - 66% = D 60% - 62% = D-

59% & below = F

Teaching Methods:

E. Presentation slides

F. Demonstrations

Course Plan:

Weeks	**Topics**	**Tasks**	**Teaching Methods (Letters)**
1	Introduction to the course Chapter 1 Overview of Cloud Computing • Definition and essential characteristics (what the cloud is, what it supports, and how it is delivered) • A brief history and evolution of Cloud • Key cloud service providers and their services • Computing as a utility, storage services, and Cloud economics, distributed computing, managed infrastructure, and services.		A, B

2	Chapter 2 Cloud Service Providers and the Cloud Ecosystem • The Cloud Ecosystem • Cloud computing Delivery Models and Services • Amazon Web Services • Google Cloud • Service-Level and Compliance-Level Agreements • Responsibility Sharing Between a User and the CSP		A, B
3	Chapter 5 Cloud Access and Cloud Interconnection Networks • Interconnection Networks for Computer Clouds • Multi-stage Interconnection Networks • Storage Area Networks and the Fibre Channel		A, B
4	Chapter 5 Cloud Access and Cloud Interconnection Networks (continued) • Scalable Data Center Communication Architectures • Network Resource Management Algorithms • Content Delivery Networks		A, B
5	Chapter 6 Cloud Data Storage • The Evolution of Storage Technologies • Storage Models, File Systems, and Databases • Distributed File Systems; The Precursors • General Parallel File System • Google File System • Locks, Chubby – A Locking Service		A, B
6	Chapter 6 Cloud Data Storage (continued)		A, B

	• NoSQL Databases • Data Storage for Online Transaction Processing Systems • Cloud Bigtable • Megastore • Storage Reliability at Scale • Disk Locality Versus Data Locality in Computer Clouds • Database Provenance		
7	Chapter 8 Cloud Hardware and Software • Challenges; Virtual Machines and Containers • Cloud Hardware; Warehouse-Scale Computers • WSC Performance • Hypervisors • An Engine for Coarse-Grained Data-Parallel Applications		A, B
8	Chapter 8 Cloud Hardware and Software • Fine-Grained Cluster Resource Sharing • Cluster Management with BORG • Shared State Cluster Management • QoS-Aware Cluster Management • Resource Isolation • In-Memory Cluster Computing for Big Data • Containers; Docker Containers • Kubernetes		A, B
9	Exercises Midterm Exam Revision		B
10	Chapter 10 Cloud Resource Virtualization		A, B

	• Performance and Security Isolation in Computer Clouds • Virtual Machines • Full Virtualization and Paravirtualization • Hardware Support for Virtualization • XEN – A Hypervisor Based on Paravirtualization • Optimization of Network Virtualization in XEN 2.0 • Kernel-Based Virtual Machine • Nested Virtualization • Trusted Kernel-based Virtual Machine for ARMv8 • Paravirtualization of Itanium Architecture • Performance Comparison of Virtual Machine • Open-Source Software Platforms for Private Clouds • The Darker Side of Virtualization • Virtualization Software		
11	[R2] Chapter 8 Specialized Cloud Mechanisms • Automated Scaling Listener 8.2 Load Balancer • SLA Monitor • Pay-Per-Use Monitor • Audit Monitor • Failover System • Hypervisor • Resource Cluster • Multi-Device Broker • State Management Database		A, B

12	Chapter 12 Big Data, Data Streaming, and the Mobile Cloud • Types of Digital Data • Introduction to Big Data • Big Data Analytics • Apache Hadoop, Analyzing Data with Unix tools • Analyzing Data with Hadoop • Hadoop Streaming • Hadoop Echo System, IBM Big Data Strategy • Introduction to Infosphere, BigInsights, and Big Sheets		A, B
13	Project Presentations		B
14	Exercises Final Exam Revision		B

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Course: BUS298-Sustainable Employability Skills

Session: TTH

Office Hours:

Instructor:

Email: @mubs.edu.lb

Textbooks: Anderson, L.E., & Bolt, S.B. (2014). *Professionalism: Skills for Workplace Success 4th ed.* Boston: Allyn & Bacon.

Course Description: This course is designed to help students identify the knowledge and skills required for obtaining and keeping employment. Course work will emphasize individual skill assessments, interpersonal communication skills, workplace responsibilities, teamwork skills, safety issues, and personal management skills for the workplace.

Course Objectives: This course instructs students on value clarification and matching assessment skills into employment, dealing with barriers to employment, setting priorities in work and personal life, communicating effectively with employers, supervisors, and co-workers, teamwork approach to completing tasks, and other soft skills needed in today's workplace.

Learning Outcomes:

1. To help students explore their values and career choices through individual skill assessments
2. To make realistic employment choices and to identify the steps necessary to achieve a goal
3. To develop and practice self management skills for the work site
4. To explore and practice basic communication skills
5. To learn skills for discussing and resolving problems on the work site
6. To assess and improve personal grooming
7. To promote safety awareness including rules and procedures on the work site

Grade Allocation:

Class Participation and Attendance	10%
Assignments and Research Projects • *Collaborative Research* • *Prob-Solution Research* • *Debate Research* • *Misc. Assignments*	10% *2.5%* *2.5%* *2.5%* *2.5%*
Midterm Exam *(All material until this point)*	25%
Oral Presentations/Speeches • *Impromptu* • *Collaborative* • *Prob-Solution* • *Debate*	25% *0%* *5%* *10%* *10%*
Final Examination *(All material until this point: BK 1& 2)*	30%

Grading Scale:

93%-100% = A 90%-92% = A- 87%-89% = B+ 83%-86% = B

80%-82% = B- 77%-79% = C+ 73%-76% = C 70%-72% = C-

67%-69% = D+ 63%-66% = D 60%-62% = D- 59% & below = F

Teaching Methods:

Guest Speaker: GS Student Presentation: SPR Class Discussion: CD

Group Work: GW Lecture: L Power Point: PP

Seminar: S Exam: E

Session Plan

Week	Topics	Tasks	Teaching Methods
Week 1	Introduction to the course, course policy, & attendance regulations	• Read Chapters 1 & 2	• L, CD
Week 2	**Module 1:** Attitude, Goal Setting and Life Management	• Read Chapters 3 & 4	• L, CD, PP
Week 3	**Module 1:** Personal Financial Management	• Read Chapters 3 & 4	• L, CD, PP
Week 4	**Module 1:** Time and Stress Management Organization Skills Etiquette/Dress	• Read Chapters 13, 14, & 15 • Study for Exam	• L, CD, GW, PP
Week 5	**Module 4:** Job Search Skills Resumé Package **LAB**	• Read Chapters 15 & 16 • Study for Exam	• L, CD, PP, GS
Week 6	**Midterm Exam**	• Read Chapters 15 & 16	• E
Week 7	**Module 4:** Interview Techniques Career Changes **LAB**	• Read Chapters 5 & 6	• L, CD, PP, GS
Week 8	**Module 2:** Ethics, Politics, and Diversity Accountability & Workplace Relationships	• Read Chapters 7 & 8	• L, CD, PP
Week 9	**Module 2:** Quality Organizations & Service **APA** **Assign Projects & Presentations**	• Read Chapters 7 & 8 • Prepare for Presentations & Project	• PP, L, CD
Week 10	**Modules 2 & 3:** Human Resources & Policies & Communication	• Read Chapter 10 • Prepare for Presentations & Project	• L, CD,
Week 11	**Module 3:** Electronic Communications	• Read Chapter 11 & 12 • Prepare for Presentations & Project	• PP, L, CD, GS
Week 12	**Module 3:** Motivation, Leadership and Teams Conflict and Negotiation	• Read Chapter 11 & 12	• PP, L, CD

		• Prepare for Presentations & Project	
Week 13	**Projects & Presentations**	• **Review for Final**	• **SPR**
Week 14	Review for Final Exam	• Review for Final Exam	• L, CD, GW
Final Exams			

Classroom Policies:

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respect is required between students and instructors as well as between students themselves. Any notion of misconduct will be reported to the administration and may lead to suspension, probation, or dismissal from the university.

Assignments & Projects: Assignments and projects must be turned in by the **set due date**. If you are absent from class, you should call a fellow classmate to find out if there were any assigned exercises during your absence. You are responsible for any and all information given during your absence.

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Course: CSC202 Programming I

Session:

Office Hours:

Textbook: Visual C# How to Program, 6th Edition, Dietel & Dietel, Pearson (2016).

Instructor:

Email:

Course Description:

This course teaches you the fundamentals of programming with C# by using Visual Studio 2015 and the .NET Framework. You will also learn the fundamental skills that are required by all programmers irrespective of the actual programming language they use (Algorithm and flowchart). You'll learn how to declare variables and how to use operators such as plus (+) and minus (-) to create values. You'll be taught to write methods and pass arguments to methods. You'll discover how to use selection statements such as if and iteration statements such as while. You'll also learn how to use arrays and strings. These topics form the core of C#, and from this solid foundation, you'll progress to more advanced features in CSC203 Programming II.

Course Objectives:

This is an introductory course in programming using the C# language. After the completion of this course, you should know how to read, write, and debug basic programs using good programming styles, and how to create modular documented programs using standard naming conventions.

Learning Outcomes:

After the successful completion of this course, the student should be able to:

1. Understand how computer programming is used to solve problems, motived by the student's own subject specialization
2. Use pseudo-code and Flowchart techniques for the planning and development of programming sequences
3. Develop programs using conditional statements and loops
4. Write statements that display output and gather input
5. Use user-defined methods to implement modular programming techniques
6. Develop programs using single and multi-dimensional arrays
7. Write a program that includes best practices and documentation/comments
8. Make use of available program libraries

Grade Allocation:

Attendance = 5% Participation = 5% Assignments and Quizzes = 30% Mid-Term Exam = 30% Final Exam = 30%

Grading Scale:

97% - 100% = A+ 93% - 96% = A 90% - 92% = A-

87% - 89% = B+ 83% - 86% = B 80% - 82% = B-

77% - 79% = C+ 73% - 76% = C 70% - 72% = C-

67% - 69% = D+ 63% - 66% = D 60% - 62% = D-

59% & below = F

Teaching Methods:

G. Presentation + Whiteboard

H. Hands-on Programming

I. Lab: Writing and Executing C# Programs

Course Plan:

Weeks	**Topics**	**Teaching Methods**
1	Introduction to the Course Chapter 1 Introduction to Visual C# • C# Fundamentals • Microsoft's .NET Framework	A
2	Chapter 5: Algorithm Development and Control Statements: Part 1 • Decision Structures • if-then-else Structure • Relational Operators • Loops • While Loop	A, B

	• Flowchart & Tracing for while Loop Exercises on Chapter 5 – Part 1	
3	Chapter 2: Introduction to Visual Studio and Visual Programming • Overview of the Visual Studio Community IDE • Menu Bar and Toolbar • Navigating the Visual Studio IDE • Help Menu • Creating a Simple App that Displays Text and an Image Lab: Using Visual Studio 2015 IDE	A, C
4	Chapter 3: Introduction to C# programming • A Simple C# App: Displaying a Line of Text • Formatting Text with Console.Write and Console.WriteLine • Another C# App: Adding Integers • Memory Concepts	A
5	Chapter 3: Introduction to C# programming (continued) • Arithmetic. • Decision Making: Equality and Relational Operators Lab: Exercises on Chapter 3	A, C
6	Chapter 5: Algorithm Development and Control Statements: Part 1 • Algorithms • Pseudocode • Control Structures • if Single-Selection Statement	A
7	Chapter 5: Algorithm Development and Control Statements: Part 1 • if… else Double Selection Statement	A, C

	• Nested if…else Statements • while iteration Statement Lab: Exercises on Chapter 5 – Part 1	
8	Chapter 5: Algorithm Development and Control Statements: Part 1 • Formulating Algorithms: Counter-Controlled Iteration • Formulating Algorithms: Sentinel-Controlled Iteration • Formulating Algorithms: Nested Control Statements • Compound Assignment Operators • Increment and Decrement Operators • Simple Types	A
9	Exercises on Chapter 5 – Part 2 Lab: Exercises on Chapter 5 – Part 2 Midterm Exam Revision	B, C
10	Chapter 6: Control Statements Part 2 • Essentials of Counter-Controlled Iteration • *for* Iteration Statement • *do… while* Iteration Statement • *switch* Multiple-Selection Statement • *break* and *continue* Statements • Logical Operators Lab: Exercises on Chapter 6	A, C
11	Chapter 7: Methods • Packaging Code in C# • *static* Methods, *static* Variables, and Class Math • Methods with Multiple Parameters • Notes on Declaring and Using Methods • Argument Casting	A, C

	• Scope of Declaration Lab: Exercises on Chapter 7	
12	Chapter 8: Arrays • Arrays Concept • Declaring and creating arrays • Examples using arrays • Passing Arrays and Array Elements to Methods Lab: Exercises on Chapter 8	A, C
13	Chapter 8: Arrays • Multidimensional Arrays • Declaring and creating two-dimensional Arrays • Examples using two-dimensional arrays Exercises on Chapters 6, 7, 8 – Part 1	A, B
14	Exercises on Chapters 6, 7, 8 – Part 2 Final Exam Revision	A, B

Classroom Policies:

Attendance:

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Assignments and Projects:

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Go Green:

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Course: CSC 304 Database Systems

Session:

Office Hours:

Textbook: Database System Concepts, 7th Edition, A. Silberschatz, H. F. Korth, & S. Sudarshan, McGraw-Hill (2019).

Instructor:

Email:

Course Description:

Database systems are designed to manage large bodies of information. Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information. In addition, the database system must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results.

This course provides students with the necessary knowledge and skills to understand and participate in the principles and practice of database systems development. Students learn how to use database design models, such as the Entity-Relationship and the Relational Models, to create the database design. In addition, the course teaches students how to manipulate database data using the Structured Query Language (SQL). Finally, the course teaches students how to create advanced database programs, such as SQL views, stored procedures, and triggers.

Course Objectives

The objective of the course is to present an introduction to database management systems (DBMS), with a focus on how to design and modulate a relational database, and how to organize, manipulate, and retrieve data from a DBMS efficiently and effectively.

Course Prerequisites:

CSC203 Programming II

Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Understand the concepts of relational databases
2. Acquire an understanding of introductory SQL
3. Attain an awareness of Interactive System Design
4. Understand the techniques of introductory systems analysis and design (including data modeling, entity data modeling, entity modeling and fact finding techniques)

5. Obtain an insight into the different types of DBMSs and their commonalities and differences
6. Construct a complete database design from its description requirements using the Entity-Relationship Model
7. Build the tables of a database using the Database Relational Model
8. Implement databases in a DBMS using various SQL queries and commands
9. Retrieve information effectively and efficiently in SQL and display it on a screen and in printed form
10. Build a prototype to aid in the design and development of an application.

Grade Allocation:

Final grades for this course will be based on the following:

Attendance:	5%
Participation:	5%
Assignments and Quizzes:	15%
Project:	20%
Midterm Exam:	25%
Final Exam:	30%

Grading Scale:

97% - 100% = A+	93% - 96% = A	90% - 92% = A-
87% - 89% = B+	83% - 86% = B	80% - 82% = B-
77% - 79% = C+	73% - 76% = C	70% - 72% = C-
67% - 69% = D+	63% - 66% = D	60% - 62% = D-

59% & below = F

Teaching Methods:

A. The class will be conducted as a combination of lecture and lab exercises. Theoretical presentations will be followed by design and programming exercises to be solved under the instructor's supervision.

B. Practical sessions will be held in the computer lab. Each student will work on his/her own laptop computer or on lab computers. Design exercises will be done via a graphical design software (EDraw Max), while programming exercises will be executed using the MySQL software.

Course Plan:

Week	Topics	Teaching Methods
1	Introduction to the Course Chapter 1 Introduction to Database Systems • Database-System Applications • Purpose of Database Systems • View of Data • Database Languages • Database Design • Database Engine • Database and Application Architecture • Database Users and Administrators • History of Database Systems	A
2	Chapter 6 Database Design Using the E-R Model • Database Management System • Overview of the Design Process • The Entity-Relationship Model • Complex Attributes • Mapping Cardinalities • Primary Key	A
3	Chapter 6 Database Design Using the E-R Model (continued) • Removing Redundant Attributes in Entity Sets • Extended E-R Features • Alternative Notations for Modeling Data	A

	Exercises on Chapter 6	
4	Lab Exercises: E-R Modeling Introduction to Course Project	A, B
5	Chapter 2 Relational Model • Structure of Relational Databases • Database Schema • Keys • Schema Diagrams • Reducing E-R Diagrams to Relational Schemas • Relational Query Languages • The Relational Algebra Exercises on Chapter 2	A
6	Chapter 3 Introduction to SQL • Overview of the SQL Query Language • SQL Data Definition • Basic Structure of SQL Queries • Additional Basic Operations	A
7	Chapter 3 Introduction to SQL (continued) • Set Operations • Null Values • Aggregate Functions Lab: Creating Databases and Database Tables	A, B
8	Exercises on Chapter 3 – Part 1 Midterm Exam Revision	A
9	Chapter 3 Introduction to SQL (continued) • Nested Subqueries • Modification of the Database	A

10	Exercises on Chapter 3 – Part 2 Chapter 4 Intermediate SQL • Join Expressions • SQL Views	A, B
11	Lab: Executing Queries (Select, Delete, ….) Chapter 4 Intermediate SQL (continued) • Transactions • Integrity Constraints	A, B
12	Chapter 4 Intermediate SQL (continued) • Index Definition in SQL • Authorization Exercises on Chapter 4 – Part 1	A
13	Exercises on Chapter 4 – Part 2 Lab: Execute advanced SQL operations (views, transactions, indexes)	A, B
14	Final Project Presentations Final Exam Revision	A

Classroom Policies:

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Course: CSC314 Mobile Application Development

Session:

Office Hours:

Textbook: Android Boot Camp for Developers Using Java, 3rd Edition. C. Hoisington, Course Technology | Cengage Learning (2016)

Instructor:

Email:

Course Description:

This course focuses on the development of advanced mobile applications using Android platform. Students will be introduced to the Android environment and learn the necessary skills for creating, simulating and deploying Android applications. The topics include: Android platform installation, AndoidManifest, user interfaces, data persistency, geo-locations, media handling, networking, services and deployment. Students are also exposed to business models and current trends in mobile application development.

Course Objectives:

1. To introduce the Android operating system
2. To teach native application development for Android
3. To teach advanced application design
4. To understand the use of a mobile device API

Course Prerequisites:

CSC216 Advanced Java Programming

CSC304 Database Systems

This is an app development introductory course aimed for undergraduate students who have Java programming experience. However, there is a significant amount of programming in this course requiring a commitment on the part of the student.

Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Understand and use an Android platform
2. Develop simple applications for an Android device
3. Design effective user interfaces for mobile applications
4. Use an Android application with a database
5. Describe how to use lists, arrays, and Web browsers in an Android app

6. Understand how to include audio such as music in Android apps
7. Demonstrate how to use an Android layout tool called a GridView
8. Use GPS to access maps and navigation
9. Develop an Android application on a real device

Grade Allocation:

Attendance = 5%

Participation = 5%

Projects = 40%

Mid-Term = 25%

Final exam = 25%

Grading Scale:

97% - 100% = A+ 93% - 96% = A 90% - 92% = A-

87% - 89% = B+ 83% - 86% = B 80% - 82% = B-

77% - 79% = C+ 73% - 76% = C 70% - 72% = C-

67% - 69% = D+ 63% - 66% = D 60% - 62% = D-

59% & below = F

Teaching Methods:

J. Presentation + Whiteboard

K. Hands-on Programming

Course Plan:

Weeks	**Topics**	**Teaching Methods**
1	Introduction to the course Chapter 1 Introduction to Android • Features of the Android • Writing Android Apps • Android Emulator	**A, B**

	• First Venture into the Android World • Opening Android Studio to Create a New Project • Creating the Hello Android World Project • Building the User Interface • Designing the User Interface Layout within the Virtual Device • Modifying the Text in the TextView Control • Testing the Application in the Emulator	
2	Chapter 2 The Android User Interface • Designing an Android App • The Big Picture • Using the Android User Interface • Relative Layouts and Linear Layouts • Designing the Healthy Recipes Opening User Interface • Android Text Properties • Adding a File to the Resources Folder • Adding an ImageView Control • Adding a Button Control 56 • Creating Activities • Planning a Program • Adding a Class File • Coding the Java Activity • Coding an onCreate Method • Displaying the User Interface • Creating a Button Event Handler • Coding a Button Event Handler • Correcting Errors in Code • Saving and Running the Application	**A, B**

3	Chapter 3 Android User Input, Variables, and Operations • Theme in the styles xml File • Simplifying User Input • Using Android Text Fields • Using the Android Spinner Control • Adding the Button, *TextView*, and *ImageView* Controls Coding the *EditText* Class for the Text Field • Coding the Spinner Control • Instantiating the Button Control • *GetText*( ), *SetText*( ) Methods	**A, B**
4	Chapter 4 Icons and Decision-Making Controls • Customizing a Launcher Icon • Displaying the Action Bar Icon Using Code RadioButton and RadioGroup Controls • Changing the Text Color of Android Controls • Changing the Margins • Changing the Layout Gravity • Coding a RadioButton Control • Coding the Button Control • Making Decisions with Conditional Statements • Toast Notification	**A, B**
5	Chapter 5 Android Lists, Arrays, and Web Browsers • Creating a List • Extending a ListActivity • Using a setListAdapter and Array Adapter • Adding the Images to the Resources Folder • Adding the String Table • Creating a Custom XML Layout for a ListView	**A, B**

	• Coding a setListAdapter with a Custom XML Layout Using the onListItemClick Method • Android Intents • Launching the Browser from an Android Device • Adding Multiple Class Files • Designing XML Layout Files	
6	Chapter 6 Implementing Audio in Android Apps • Creating a Splash Screen • Adding a Background Image to a TextView Widget • Creating a Time • Scheduling a Timer 229 • Life and Death of an Activity • Launching the Next Activity • Class Variables • Playing Music • Creating a Raw Folder for Music Files • Using the MediaPlayer Class 244 • The MediaPlayer State • Changing the Text Property Using Code • Changing the Visibility Property Using Code	**A, B**
7	Chapter 7 Displaying Pictures in a GridView • Adding a GridView Control • Adding the ImageView Control and Image Files • Creating an Array for the Images • Instantiating the GridView and ImageView Controls • Using a setAdapter with an ImageAdapter • Coding the OnItemClickListener • Coding a Custom Toast Notification	**A, B**

	• Displaying the Selected Image • Customizing the ImageAdapter Class • Defining the Context of the ImageAdapter Class	
8	Chapter 8 Using a DatePicker on a Tablet • Designing a Tablet Application • Design Best Practices for Tablets • Adding an Android Virtual Device for the Tablet • Creating a Tablet App • Creating the String Table • Designing a Tablet Table Layout • Date, Time, and Clocks • Instantiating the Objects • Using the Calendar Class • DatePickerDialog Input • Adding the onDateSet( ) Method • Displaying the Date Using the getTime( ) Method	**A, B**
9	Exercises Midterm Exam Revision	**B**
10	Chapter 9 Navigating with a Master/Detail Flow Activity on a Tablet • Understanding Responsive Design • Using Application Templates • Master/Detail Flow Template • Understanding the Structure of the Master/Detail • Flow Template • Adding Images to the Drawable Folder • Designing an XML TableLayout	**A, B**

	• Creating a TextView XML Layout for the Second List Item • Creating a WebView XML Layout for the Third List Item • Customizing the Item List • Displaying the Custom Layout in the Detail Pane	
11	Chapter 10 Creating Animation • Android Animation • Adding the Layout for the Frame Image and Button Controls • Creating Frame-by-Frame Animation • Coding the AnimationDrawable Object • Setting the Background Resource • Adding Two Button Controls • Using the Start and Stop Methods • Creating Tween Animation • Creating a Second Activity and XML Layout • Tween Animation • Adding the Layout for the Tween Image • Coding a Tween Rotation XML File • Coding a StartAnimation • Changing the Emulator to Landscape Orientation	**A, B**
12	Chapter 11 Discover! Persistent Data • Understanding Persistent Data • Using Shared Preferences • Using Internal Storage • Using External Storage • Using SQLite Databases	**A, B**

	• Using a Network Connection • Creating XML Layout Files • Creating a Second Activity and XML Layout • Instantiating the XML Controls • Writing Persistent Data with SharedPreferences • Launching the Second Activity • Instantiating the Second Activity Controls • Retrieving Preferences • Coding an ImageView Control	
13	Project Presentations	**A**
14	Exercises Final Exam Revision	**B**

Classroom Policies:

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Course: CSC215 Web Client Programming

Session:

Office Hours:

Textbook: Internet and World Wide Web How to Program, 5th Edition, Deitel & Deitel, Prentice Hall (2011)

Instructor:

Email:

Course Description:

The course provides a solid web development foundation, focusing on content and client-side (browser) components (HTML5, XHTML, CSS, JavaScript, multimedia). Initially, HTML is covered which enables the student to fully understand the primary constructs of any web page. Students will learn how to build web pages by following a series of step-by-step instructions and interactive web-based exercises. Next, web graphical formats and web page design issues will be discussed via Cascading Style Sheets (CSS). Next, the student will learn about web client-side scripting using the JavaScript language, and how to use JavaScript to control and modify the webpage on the browser. Finally, students will learn how to create Rich Internet Applications (RIAs) using JSON. During the course, students produce an interactive website on the topic of their choice for the final project and leave the course prepared for more advanced and server-side focused web development topics in "CSC320 Web Server Programming".

Course Objectives:

5. Learning how to read and write HTML and CSS code
6. Create a full functioning client-based website
7. Become familiar with different web design models and web languages

Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Understand the hierarchy of HTML to learn the basics of web page content
2. Write well-organized, standards-compatible, and user-friendly HTML code
3. Write well-organized and standards-compatible CSS code to modify the visual appearance of webpage contents and present HTML pages in different styles
4. Utilize the basics of JavaScript to build interactive web pages with dynamic content
5. Write well-organized JavaScript code following established good practices
6. Use JavaScript to access and utilize web services for dynamic content (AJAX and JSON).

Grade Allocation:

Attendance = 5%	Participation= 5%	Quizzes/Homework= 15%
Project= 20%	Mid-Term Exam= 25%	Final Exam= 30%

Grading Scale:

97% - 100% = A+	93% - 96% = A	90% - 92% = A-
87% - 89% = B+	83% - 86% = B	80% - 82% = B-
77% - 79% = C+	73% - 76% = C	70% - 72% = C-
67% - 69% = D+	63% - 66% = D	60% - 62% = D-

59% & below = F

Teaching Methods:

The class will be conducted as a combination of lecture and programming exercises, theoretical presentations will be followed by some brief case studies/exercises to be solved under the instructor's supervision.

Problem-solving sessions will be held in a computer lab, each student will work on his/her own laptop computer or lab computers, with a standardized software toolbox (Microsoft Visual Studio .NET).

Teaching Methods:

L. Presentation + Whiteboard
M. Hands-on Programming

Course Plan:

Weeks	Topics	Teaching Methods (Letters)
1	Introduction to the course Chapter 1 Introduction to Computers and the Internet • The Internet in Industry and Research • HTML5, CSS3, JavaScript, Canvas and jQuery • Evolution of the Internet and World Wide Web • Web Basics • Multitier Application Architecture • Client-Side Scripting versus Server-Side Scripting • World Wide Web Consortium (W3C) • Web 2.0	A
2	Chapter 2 Introduction to HTML5: Part 1 • Introduction • Editing HTML5 • First HTML5 Example • W3C HTML5 Validation Service • Headings • Linking • Images • Special Characters and Horizontal Rules • Lists	A
3	Chapter 2 Introduction to HTML5: Part 1 (continued) • Tables • Forms • Internal Linking • *meta* Elements	A, B

	• Web Resources Exercises on Chapter 2	
4	Chapter 3 Introduction to HTML5: Part 2 • New HTML5 Form *input* Types • *input* and *datalist* Elements and *autocomplete* Attribute • Page-Structure Elements Exercises on Chapter 3	A, B
5	Chapter 4 Introduction to Cascading Style Sheets (CSS): Part 1 • Inline Styles • Embedded Style Sheets • Conflicting Styles • Linking External Style Sheets • Positioning Elements: Absolute Positioning, z-index • Positioning Elements: Relative Positioning, span 150 • Backgrounds • Element Dimensions • Box Model and Text Flow • Drop-Down Menus • User Style Sheets	A
6	Exercises on Chapter 4 Chapter 6 JavaScript: Introduction to Scripting • Inline Styles • First Script: Displaying a Line of Text with JavaScript • Modifying Your First Script	A, B

	• Obtaining User Input with *prompt* Dialogs • Memory Concepts • Arithmetic • Decision Making: Equality and Relational Operators	
7	Chapter 7 JavaScript: Control Statements I • Algorithms • Pseudocode • Control Statements • *if* Selection Statement • *if*…*else* Selection Statement • *while* Repetition Statement • Formulating Algorithms: Counter-Controlled Repetition • Formulating Algorithms: Sentinel-Controlled Repetition • Formulating Algorithms: Nested Control Statements • Assignment Operators • Increment and Decrement Operators Chapter 8 JavaScript: Control Statements II • Essentials of Counter-Controlled Repetition • *for* Repetition Statement • Examples Using the *for* Statement • *switch* Multiple-Selection Statement • *do*…*while* Repetition Statement • *break* and *continue* Statements • Logical Operators	A
8	Exercises on Chapters 6, 7, 8	B

	Midterm Exam Revision	
9	Chapter 9 JavaScript: Functions • Program Modules in JavaScript • Function Definitions • Notes on Programmer-Defined Functions • Random Number Generation • Scope Rules • JavaScript Global Functions • Recursion • Recursion vs. Iteration • Function Definitions	A
10	Chapter 10 JavaScript: Arrays • Declaring and Allocating Arrays • Examples Using Arrays • Random Image Generator Using Arrays • References and Reference Parameters • Passing Arrays to Function • Sorting Arrays with Array Method *sort* • Searching Arrays with Array Method *indexOf* Chapter 11 JavaScript: Objects • *Math* Object • *String* Object • *Date* Object • *Boolean* and *Number* Objects • *document* Object • Using JSON to Represent Objects	A
11	Exercises on Chapters 9, 10, 11	B

12	Chapter 12 Document Object Model (DOM) • Modeling a Document: DOM Nodes and Trees • Traversing and Modifying a DOM Tree • DOM Collections • Dynamic Styles Chapter 13 JavaScript Event Handling: A Deeper Look • Reviewing the *load* Event • Event *mousemove* and the event Object • Rollovers with *mouseover* and *mouseout* • Form Processing with *focus* and *blur* • More Form Processing with *submit* and *reset* • Event Bubbling	A
13	Exercises on Chapters 12 and 13 Chapter 15 XML • XML Basics • Structuring Data • XML Namespaces • Document Type Definitions (DTDs) • W3C XML Schema Documents • Extensible Stylesheet Language and XSL • Document Object Model (DOM)	A, B
14	Chapter 16 Ajax-Enabled Rich Internet Applications with XML and JSON • Introduction • Rich Internet Applications (RIAs) with Ajax • "Raw" Ajax Example Using the XML *HttpRequest* Object • Using XML and the DOM	A, B

	• Creating a Full-Scale Ajax-Enabled Application Exercises on Chapters 15 and 16 Final Exam Revision	

Classroom Policies:

Attendance:

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Go Green:

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Course: CSC216 Advanced Java Programming

Session:

Office Hours:

Textbook: [T1] Java How to program, 11th Edition, Dietel & Dietel, Pearson (2017)

[T2] Introduction to Java Programming, 10th Edition, Y. Daniel Liang, Pearson (2014).

Instructor:

Email:

Course Description:

This course covers several basic and advanced programming concepts in the Java Programming Language. The course starts with introducing the fundamentals of the Java Language. Next, object oriented concepts in Java are briefly discussed. The course continues with introducing students to graphical user interface in Java using the JavaFX library. The students learn how to use Java graphical classes, such as Nodes, Shapes, Controls, and Panes to construct GUI-enriched Java applications. In addition, the student learns how to handle files in Java, and how to create multiple threads and run them from a Java application.

Course Objectives:

1. Learning object-oriented programming with JAVA
2. Designing and implementing GUI-based Java application using JavaFX
3. Opening, reading, and writing to text files from Java Programs
4. Using the Java Exception Handling to detect and handle program errors
5. Creating multiple threads and running them in parallel

Course Prerequisites:

CSC203 Programming II

Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Understand the notions of abstract data types and create Java ADTs via classes
2. Understand how to create, use, and control access to various object variables and methods
3. Understand how to use static data and methods members, and how to redefine (i.e., overload) operators to work with new types
4. Create new classes by inheriting from existing classes

5. Understand the notion of polymorphism
6. Identify JavaFX GUI components and specify their use cases
7. Recognize the various classes and methods that are used to create and handle events in Java applications
8. Create complete Java desktop applications with powerful and interactive graphical user interfaces
9. Outline, distinguish, and build several types of Java exceptions
10. Describe the methods for opening, reading, and writing to text files in Java
11. Implement multi-threading concepts in Java and execute multiple threads in parallel from within a Java application.

Grade Allocation:

Attendance = 5%
Participation = 5%
Lab work = 15%
Project = 20%
Mid-Term = 25%
Final exam = 30%

Grading Scale:

97% - 100% = A+ 93% - 96% = A 90% - 92% = A-
87% - 89% = B+ 83% - 86% = B 80% - 82% = B-
77% - 79% = C+ 73% - 76% = C 70% - 72% = C-
67% - 69% = D+ 63% - 66% = D 60% - 62% = D-
59% & below = F

Teaching Methods:

N. Presentation + Whiteboard
O. Hands-on Programming

Course Plan:

Weeks	Topics	Teaching Methods
1	Introduction to the course [T1] Chapter 2 Introduction to Java Applications [T1] Chapters 3 and 4 Control Statements • if-else • while and for statements • switch Multiple-Selection Statement • logical operators	**A, B**
2	[T1] Chapter 5 Methods • Declaring Methods • Method-Call Stack • Static Methods and Variables • Scope of Declarations • Method Overloading [T1] Chapter 6 Arrays and ArrayLists • Primitive Types vs. Reference Types • Declaring and Creating Arrays • Exception Handling: Processing the Incorrect Response • Pass-By-Value vs. Pass-By-Reference • Multidimensional Arrays	**A, B**
3	[T1] Chapters 7 and 8 Classes and Objects • Instance Variables, set Methods and get Methods • Initializing Objects with Constructors • Controlling Access to Members • Default and No-Argument Constructors • Composition • *enum* Types	**A, B**

	• *static* and *final* keywords	
4	[T1] Chapters 9 and 10 Inheritance and Polymorphism • Superclasses and Subclasses • *protected* Members • Using the *super* keyword • Polymorphism Examples • Demonstrating Polymorphic Behavior • Abstract Classes and Methods • *final* Methods and Classes • Creating and Using Interfaces	**A, B**
5	[T1] Practical exercises: Chapters 2 → 10	**B**
6	[T2] Chapter 14 JavaFX Basics • JavaFX vs Swing and AWT • The Basic Structure of a JavaFX Program • Panes, UI Controls, and Shapes • Common Properties and Methods for Nodes • The *Color* Class • The *Font* Class • The *Image* and *ImageView* Classes	**A, B**
7	[T2] Chapter 14 JavaFX Basics (continued) • Layout Panes • Shapes • Property Binding [T2] Chapter 16 JavaFX Controls and Multimedia • Labeled and Label • Button • CheckBox and RadioButton	**A, B**

	• TextField and TextArea • ComboBox and ListView • Video and Audio	
8	[T2] Practical exercises: Chapters 14, 16 Midterm Revision	**B**
9	[T2] Chapter 15 Event-Driven Programming and Animations • Events and Event Sources • Registering Handlers and Handling Events • Inner Classes • Anonymous Inner Class Handlers • Simplifying Event Handling Using Lambda Expressions • Mouse Events	**A, B**
10	[T2] Chapter 15 Event-Driven Programming and Animations • Key Events • Animation [T2] Practical exercises: Chapter 15	**A, B**
11	[T2] Chapter 12 Exception Handling and Text I/O • Exception-Handling Overview • Exception Types • More on Exception Handling • The finally Clause • Rethrowing Exceptions • Chained Exceptions • Defining Custom Exception Classes • The File Class • File Input and Output [T2] Practical exercises: Chapter 12	**A, B**

12	[T2] Chapter 30 Multithreading and Parallel Programming • Thread Concepts • Creating Tasks and Threads • The Thread Class • Thread Pools • Thread Synchronization [T2] Practical exercises: Chapter 30	**A, B**
13	Chapter 32 Java Database Programming • JDBC • Insert, Update, and Delete Database Data from Java • *PreparedStatement* • Retrieving Database Data into *TableView*	**A**
14	[T2] Practical exercises: Chapter 32 Final Exam Revision	**B**

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Course: CSC322 Python for Data Science

Session:
Office Hours:
Textbook: [T1] Programming in Python 3, A Complete Introduction to the Python Language, 2nd Edition, M. Summerfield, Addison-Wesley (2009)
[T2] Fundamentals of Python: First Programs, 2nd Edition, K. A. Lambert, Cengage (2019)
Instructor:
Email:

Course Description:

This course is designed to teach students how to analyze different types of data using Python. Students will learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations and predict future trends from data. The aim of this course is to teach students the Python tools that are required to analyze and employ datasets, and implement supervised and unsupervised machine-learning algorithms.

Course Objectives:

This course aims to equip students with the following skills:

1. Understanding the basics of Python for performing data analysis
2. Understanding the advanced Python data types, and utilizing Python tools to perform preprocessing, processing and data visualization to get insights from data
3. Using different python packages for mathematical, scientific applications and for web data analysis
4. Developing a model for data analysis and evaluating the model performance

Course Prerequisites:

CSC216 Advanced Java Programming

Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Appraise machine learning applications that are developed using the Python language
2. Learn how to develop machine learning algorithms in Python
3. Understand and practice Python libraries that are used to assess and employ Datasets
4. Analyze and assess the results of Python programs

Grade Allocation:

Attendance = 5%

Participation = 5%

Assignments = 10%

Project = 20%

Mid-Term = 30%

Final exam = 30%

Grading Scale:

97% - 100% = A+	93% - 96% = A	90% - 92% = A-
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77% - 79% = C+	73% - 76% = C	70% - 72% = C-
67% - 69% = D+	63% - 66% = D	60% - 62% = D-

59% & below = F

Teaching Methods:

P. Presentation slides
Q. Demonstrations

Course Plan:

Weeks	Topics	Teaching Methods
1	Introduction to the course Chapter 1 – Introduction to Python • Python Language • Python Development Environments • Python distribution: ANACONDA • Install ANACONDA with Jupyter Notebook • Create a new Jupyter Notebook • Enter code • Run a program • Hello world program	**A, B**
2	Chapter 2 – The Python Language: Built-in standard data types, basic input-output operations, mathematical & logical operators • Immutable data types: Numbers, Strings, Tuples • Mutable data types: Lists, Dictionaries, Sets • Numeric data type • Strings & substrings • Arithmetic, Assignment, Comparison, Logical, Bitwise, Identity, Membership Operators Chapter 2 Lab exercises	**A, B**
3	Chapter 3 – Lists, Tuples, dictionaries, and data processing • Lists • Strings and their specific methods, together with their similarities and differences compared to lists. • Lists that contain tuples • Tuples that contain lists	**A, B**

	• Some mathematical operations applied to String, lists and tuples • Dictionaries: indexing, adding, deleting new items • Performing list( ), sorted( ) on dictionaries Chapter 3 Lab exercises	
4	Chapter 4 – Boolean values, conditional statements & loops • Boolean values • if-elif-else instructions • the while and for loops • flow control • Nested loops Chapter 4 Lab exercises	**A, B**
5	Chapter 5 – I/O Command-line parameters • Print out and input string data • Print out and input numbers • Formatting your output • common method for storing the date and time in online transactions systems Chapter 5 Lab exercises Assignment 1 covering chapters 1 - 5	**A, B**
6	Chapter 6 – Modules, packages, and exceptions • Python modules • Import modules • Present the content of some standard modules provided by Python • Modules coupled together to make packages • try-except instructions Chapter 6 Lab exercises	**A, B**
7	Chapter 7 – Working with files • Reading and writing CSV files • Mapping the file data to a dictionary	**A, B**

	• Retrieving customized data from CSV files Chapter 7 Lab exercises	
8	Chapter 8 – Python object-oriented approach • Python object-oriented features • Classes, methods, objects, and the standard objective features • Encapsulation, Polymorphism, Inheritance principles • Implementing subclasses Chapter 8 Lab exercises Assignment 2 covering chapters 6, 7, 8	**A, B**
9	Midterm Exam Revision	**B**
10	Chapter 9 – Numpy library • Features and operations in Numpy • Creating multidimensional arrays • creating spaced range arrays using arange and linspace • Indexing and slicing • Applying mathematical functions (sum, mean, max, ...) • Creating arrays of ones, zeros, diagonal arrays... • creating random arrays Chapter 9 Lab exercises	**A, B**
11	Chapter 10 – Pandas library • Introduction to Pandas • Series • DataFrames • Missing Data • GroupBy • Merging,Joining,and Concatenating • Operations • Data Input and Output	**A, B**

	Chapter 10 Lab exercises	
12	Chapter 11 – Matplotlib library • Basic Matplotlib Commands • Creating Multiplots on Same Canvas • Setting figure and plot objects attributes • Creating subplots • Saving figures • Special Plot Types (histograms, scatter plots) Chapter 11 Lab exercises	**A, B**
13	Chapter 12 – Intro to Machine learning • Introducing machine learning using pandas, numpy, matplotlib and seaborn libraries • Training a Linear Regression Model • Grabbing predictions off the test model • Intro to Logistic Regression with Python Chapter 12 Lab exercises	**A, B**
14	Project Presentation covering chapters 1 - 12 Final Exam Revision	**B**

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