Computer Science

Study Abroad Course List

Tuition fee: 2600/2900 USD

For course syllabi, please contact the Study Abroad Office!

Course title	Semester	Credits (ECTS)
Elementary Linear Algebra	Fall	8
Calculus I.	Fall	8
Discrete Mathematics I.	Fall	8
Basic of Computer Science	Fall	8
Elementary Programming	Fall	8
Programming I.	Fall	8
Relational Database	Fall	8
System Engineering	Fall	8
Webprogramming	Fall	8
Methodology of Programming II.	Fall	8

Elementary Linear Algebra

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1.The concept of a matrix. Operations of matrices, their properties and applications. Using indices. Example for special matrices. Week 2.Elementary row and column operations. Linear equation systems. Echelon forms, reduced echelon forms, matrix equivalence. Gaussian elimination, Gauss-Jordan reduction. Week 3. Determinants: their evaluation and applications. Week 4.Elementary matrices. Inverse of a matrix. Equivalence of matrices. Week 5. Real vector spaces. Examples. Subspaces. Linear independence, Span. Week 6. Rank of a matrix. Kronecker-Capelli theorems. Applications 1. Week 7. Basis, dimension. Orthonormal basis. Change of a basis. Isomorphism of vector spaces. Week 8. Linear operators. Rank and nullity of a matrix. Properties of linear operators. Week 9. Linear operators and their matrices on orthonormal bases. Week 10 Inner product spaces. Gram-Schmidt orthogonalization. Orthogonal complement. Week 11. Eigenvalues and eigenvectors. Characteristic polynomials. Week 12. Diagonalization of symmetric matrices Week 13. Applications
Assessment methods:	Written test Assignment to be submitted during the semester

Calculus I.

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1:Convergence and divergence of number sequences. Bounds of a number series. Relationship between convergence and boundedness. Week 2: Operations with convergent sequences sum, difference, multiplication, quotient of convergent sequences. Week 3: Monotone sequences. Limit value calculation procedures. Convergence rate estimation. Week 4: Convergence and divergence of infinite series. Operations on convergent series. Week 5: Necessary condition, necessary and sufficient condition for convergence. Simple convergence criteria for positive member series: the major and minor criteria. Week 6: Simple convergence criteria: the quotient and root criteria and their consequences. Absolute and conditional convergent series. Leibniz series. Week 7: Sequences of functions. Polynomials and rational functions. Power series. Elementary functions. Week 8: Operations with functions: sum, difference, multiplication, quotient, composition of functions. The limit of functions (finite, infinite, finite and infinite limits). Week 9: Operational rules for the limit of a function. Interpretation of a power with irrational exponent. Notable function limits, limit calculation procedures. Week 10: Continuity of functions, operations with continuous functions. Week 11: Differential and differential quotient. Geometric, physical, chemical applications of differential coefficients. Rules of operations of differentiation.

	Week 12: Rules of operations of differentiation: differential ratio of sum, difference, product, quotient of differentiable functions, differential ratio of complex function. Differentiation of elementary functions. Week 13: Evaluation and closure of the semester, making up for any shortcomings.
Assessment methods:	Written test Assignments to be submitted during the semester

Discrete Mathematics I.

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1 Paradoxons in naiv set theory, Neumann universe Week 2 Relations, equivalence and partial ordering relations Week 3 Counting techiques Week 4 Binomial and polynomial theorems Week 5 Numbers, natural, integer, rational, real, complex Week 6 Naiv and formal concepts of graph Week 7 Trees, Week 8 Graph isomorhphism, Week 9 Eulerian, Hamiltonian graphs Week 10 Satisfiability problem, Davis-Putnam algorithm Week 11 Coloring the nodes of a graph Week 12 Maximal, maximum clique, k-clique problems Selected applications
Assessment methods:	Written test Assignment to be submitted during the semester

Basic of Computer Science

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2

Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1 Course introduction. Algorithmic problems, modelling. Week 2 Complexity of algorithms. Week 3 Insertion and sorting. Week 4 Packing and covering. Matching problem. Binary trees, decision trees. Graph search. Preorder, inorder and postorder tree traversals. Week 5 Connected graphs, shortest path. Knapsack problem. Suboptimal algorithms. Week 6 Longest path, Eulerian and Hamiltonian graphs. Week 7 Set Cover Problem. Graph coloring, chromatic number, planar graphs, 4-colour theorem, Kuratowski's and Wagner's theorems. Week 8 Graph diagnostics. Tournament and its winner. Generalization: logical formulas. Week 9 Parallel computing. Week 10 Modular algorithms. Polynomial division, Euclidean algorithm for integers and polynomials. Week 11 Faster multiplication and division of large numbers. Week 12 Chinese Remainder Theorem *Week 1 Turing Machines. Introduction of simulatorsoftware. 1-tape TM.* *Week 2 2-tape TM.* *Week 3 3-tape TM.* *Week 4 K-tape TM.* *Week 5 Midterm exam.* *Week 6 Sorting, next greater element. Graph search and traversals.* *Week 7 Packing problems.* *Week 8 Shortest and longest paths. Graph coloring.* *Week 9 Graph diagnostics and generalization.* *Week 10 Euclidean algorithm, polynomial division.* *Week 11 Faster multiplication and division of large numbers* *Week 12 Chinese remainder theorem.* *Week 13 Endterm exam.*
Assessment methods:	Written test Assignment to be submitted during the semester

Elementary Programming

Semester:	Fall
Form of teaching:	Practice
Class hours per week:	4
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1: Installing and using Python Week 2: Variables, data types, operators Week 3: Type conversions Week 4: Conditional statements Week 5: Functions Week 6: Arrays Week 7: Collections Week 8: Control stuctures Week 9: Test Week 10: Exceptions Week 11: Classes, Inheritance, Modules, Packeges Week 12: File Handling Week 13: Basic GUI
Assessment methods:	Written test Assignment to be submitted during the semester

Programming I.

Semester:	Fall
Form of teaching:	Practice
Class hours per week:	4
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1 Annunciation of course requirements. Foundations of algorithmic thinking. Week 2 Examples for aiding algorithmic thinking Week 3 Methods of program design. C++ programming environment. Loading the program, learning to use it, managing the framework.

	Week 4 Basic programming, basic syntax. Declaring integer and float variables, data representations, number constants, arithmetic operators, expressions. Week 5 Character type variables, character constants. Operators, precedencies. Week 6 Control structures: conditional control transfer (if, switch-case) Week 7 Debugging. Week 8 Control structures: iterations. Week 9 Pointers, arrays. Week 10 String variables. Week 11 Functions and its parameters. Week 12 Functions, standard functions. Week 13 Summary, evaluation of course fulfillment.
Assessment methods:	Written test Assignment to be submitted during the semester

Relational Database

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1: Module 1 -SQL and Relational Databases Week 2: Information and Data Models Week 3: Types of Relationships Week 4: Mapping Entities to Tables, Relational Model Concepts Week 5: Relational Model Constraints and Data Objects Week 6: Relational Model Constraints Introduction and advanced Week 7: Data Definition Language (DDL) and Data Manipulation Language (DML) Week 8: CREATE TABLE statement, Week 9: INSERT statement; SELECT statement; UPDATE and DELETE statements Week 10: String Patterns, Ranges, and Sets Week 11: Sorting Result Sets; Grouping Result Sets Week 12: Working with multiple tables Week 13: Join Overview; Inner Join; Outer Join Week 14: Exam

Assessment methods:	Written test Assignment to be submitted during the semester

System Engineering

Semester:	Fall
Form of teaching:	Lecture and Practice
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1: Module 1 -SQL and Relational Databases Week 2: Information and Data Models Week 3: Types of Relationships Week 4: Mapping Entities to Tables, Relational Model Concepts Week 5: Relational Model Constraints and Data Objects Week 6: Relational Model Constraints Introduction and advanced Week 7: Data Definition Language (DDL) and Data Manipulation Language (DML) Week 8: CREATE TABLE statement, Week 9: INSERT statement; SELECT statement; UPDATE and DELETE statements Week 10: String Patterns, Ranges, and Sets Week 11: Sorting Result Sets; Grouping Result Sets Week 12: Working with multiple tables Week 13: Join Overview; Inner Join; Outer Join Week 14: Exam
Assessment methods:	Written test Assignment to be submitted during the semester

Webprogramming

Semester:	Fall
Form of teaching:	Practice + Seminar
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 13 Designing web pages, web ergonomics. Testing websites from user perspective. Basic

	standards and their importance in web design. Displaying web pages using different devices and browsers. Good and bad example pages. Selecting the proper web hosting service. Uploading and publishing web content. Web development using localhost. Week 14 Basics of HTML. Structure and components of a standard webpage. Main parts of the HTML structure. Understanding and using basic HTML tags. Validating HTML files. Week 15 Importance of separating style and content. Basic structure and the general syntax of CSS. A basic style sheet. Internal style sheets and inline styles. Style classes and selectors. Cascading order and inheritance in CSS. Validating Cascading Style Sheets. Week 16 Formatting letters, words, and paragraphs with CSS. Aligning text. Styling lists, tables, and hyperlinks. Adding colours, graphics, and multimedia elements to web pages. Understanding the CSS box model and positioning. Working with margins and padding. Week 17 Creating web pages using CSS templates. The typical terms of use of CSS templates. Finding, downloading, and customizing templates. Formatting and cleaning the code. Week 18 Basic elements and syntax of PHP, Combining HTML and PHP. Using variables. Data types, operators and expressions. Different types of variables, changing data types. Controlling flow with conditions and loops. Week 19 Using arrays in PHP. Understanding the most common array functions and tools. Associative and multidimensional arrays. Week 20 Creating forms with HTML5. HTML5 form elements and their properties. Week 21 Processing forms with PHP. Using the GET and POST methods. Striping out HTML tags and special characters from the input. Security issues. Week 22 Creating and managing relational databases using command line and graphical user interfaces. Reviewing the data types of the selected database management system. Creating, modifying and deleting tables. Making queries from single and joined tables. Week 23 Connecting to databases using PHP. Formatting and displaying query results in web pages. Processing and storing user inputs in databases. Manipulating data values using web resources.

	Week 24 Embedding external components (e.g. Google Maps, Social plugins, YouTube videos, etc) into websites. The risks of using third party modules. Week 13 Final exam.
Assessment methods:	Written test Assignment to be submitted during the semester

Methodology of Programming II.

Semester:	Fall
Form of teaching:	Practice + Seminar
Class hours per week:	2+2
Credits (ECTS):	8
Language of instruction:	English
Course description:	Week 1: Network Architecture, API, DMZ Week 2: Multi-layered Application Logic, MVC Week 3: Spring Boot, Rest API Week 4: Build Spring Boot Application, Establish database connection Week 5: Interfaces, Micro Services Week 6: RESTfull APIs, Custom Annotations Week 7: Custom Exception Week 8: Swagger UI Week 9: Logging Errors and Exceptions Week 10: Aspect Oriented Programming Week 11: Creational Design Patterns Week 12: Structural Design Patterns Week 13: Behavioral Design Patterns, Miscellaneous Design Patterns
Assessment methods:	Written test Assignment to be submitted during the semester