General Information:

INTRODUCTION TO COMPUTING SCIENCE

Name of Course:
Course Code: IVB365ANMI
Semester: 1st
Number of Credits: 4
Allotment of Hours per Week: 2 lectures, 2 labs
Evaluation: Exam (with grade)
Prerequisites: -

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Introduction, Learning Outcomes
The lectures give some elements of important mathematical techniques that are used in computer science practice.
Upon completion of this course, the student should be able to: **interpret,** and **put into practice**

- **a.** Mathematical Induction
- **b.** Binomial Theorem
- **c.** Extended Euclidean Algorithm
- **d.** RSA encoding-decoding algorithm
- **e.** Depth-first search, Breadth-first search
- **f.** Dijkstra's Algorithm

General Course Description and Main Content:
Brief Syllabus: This lecture- and practical-based course aims to give computer science students a solid mathematics basis through covering the following topics:

Peano's axioms for the set of Natural Numbers, number systems, arithmetic operations in different number systems, Euclidean algorithm, divisibility, greatest common divisor, lowest common multiple, number of divisors, prime numbers, the fundamental theorem of Number Theory, congruencies, operations on congruencies, remainder classes, complete and reduced system of remainders, Euler's & Fermat's theorem, Euler's totient function, linear congruencies and systems of congruencies, Chinese Remainder Theorem, cryptography, RSA coding. Dijkstra algorithm, Bellman-Ford algorithm.

Students learn the basics of mathematics enabling them to interpret and understand computer science and through solving elementary tasks they deepen their basic theoretical knowledge.

Methodology:
The presentations give an introduction to important mathematical techniques of exercise solving and the basic theory of number theory. Equal emphasis is given to learning new mathematics and to learning how to construct and write down correct mathematical arguments.

Introduction to Computing Science **Course Syllabus**

Course Code: IVB365ANMI Time: L Monday 15:00-16:30

Semester: Autumn 2019/2020 1. P Monday 16:45-18:15

Location: PTE MIK, L A-205, P A-205

Schedule:

Study period in 15 weeks: 2 September - 14 December 2019

1. Opening ceremony of the university year.
2. Division with remainder, divisibility, remainder classes. Euclidean algorithm.
3. Peano's Axioms, mathematical induction.
4. Binomial Theorem, variations of mathematical induction.
5. Representation of numbers in different number systems. Sets of numbers, cardinalities.
6. Depth-first search, Breadth-first search.
7. Revision before test; Midterm Test in the practice class.
8. Extended Euclidean Algorithm.
9. Autumn break
10. Diophantine equations. Linear congruencies.
11. Chinese remainder theorem, system of linear congruencies.
12. RSA cryptosystem.
13. Revision before test; Test 2 in the practice class
14. Retake of Test 1 and Test 2
15. Oral exam

Further exams are possible in the exam period that starts on 16 December 2019.

Attendance:

Attending all classes is required. In case of absence from more than 30% of the total number of lessons will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence.

Evaluation + Grading

Grading will follow the course structure with the following weight:

1. Tests 100%
2. Proposed exam grade: over 65 % during the study and correction period.
3. Written exam in the exam period. A minimum of 55% is required to pass the exam.

Grading scale

Numeric Grade:	5	4	3	2	1
Evaluation in points:	89%-100%	77%-88%	66%-76%	55%-65%	0-54%

Students with special needs:

Students with special physical needs and requiring special assistance must first register with the Dean of the Students Office. All reasonable requests to provide an equal learning environment for all students is to be assured.

Available sources about the topics of the course:

Mathematical Induction – on Wikipedia;
Binomial Theorem – on Wikipedia;
Extended Euclidean Algorithm – on Wikipedia;
Chinese Remainder Theorem – on Wikipedia;
RSA cryptosystem – on Wikipedia;
Depth-first search, Breadth-first search – on Wikipedia;
Dijkstra's Algorithm – on Wikipedia.

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