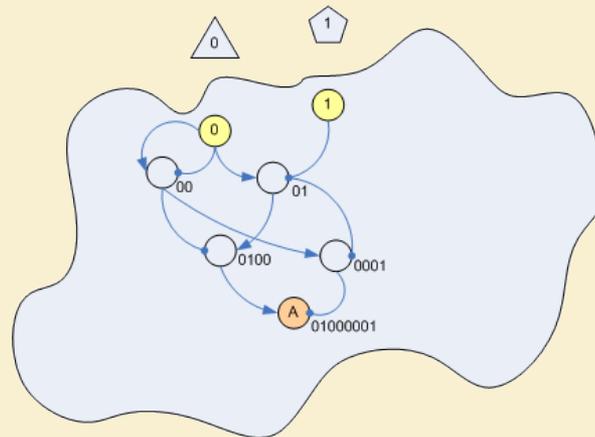


# Data Structures and Algorithms

## *Lecture 1: Course Overview*

Lilia Georgieva



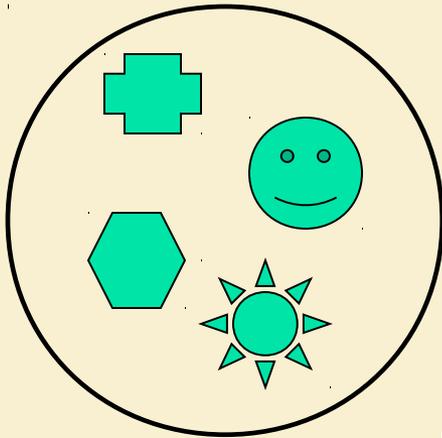
# What is this course about?

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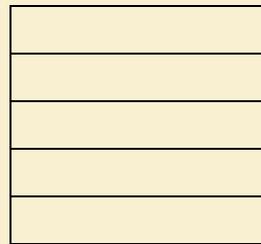
- We will study **moderately** complex data structures and algorithms that are essential in core areas of computer science
  - Compilers
  - Operating Systems
  - Database Systems
  - Search Engines
  - etc.
- This is one of the most important (and fun) courses you will take
  - Prerequisite for almost all other upper year courses

# Simple data structures you have seen

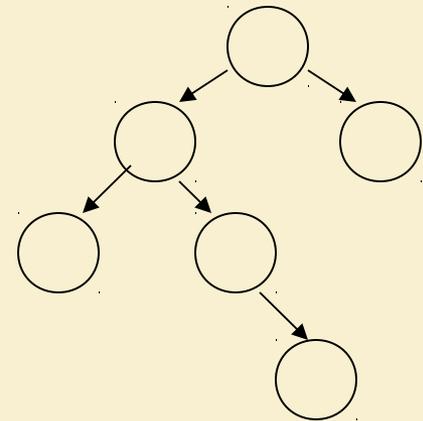
Data structure = representation and operations associated with a data type



Set/bag



Array



Tree

# Simple algorithms you have seen

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- Binary search
- Bubble sort
- Quick sort

# Knowledge Assumed

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- We assume you know basic data structures
  - Arrays, bags, lists, stacks, queues, linked lists
  - Functions, logarithms, exponents, sets, series, derivatives, limits
  - Abstract Data types
  - Basic object oriented design concepts
    - abstraction, encapsulation, modularity

# Skills Assumed

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- **We assume you know how to program in Java**
  - can design, implement, test, debug, and document simple Java programs
  - can read and understand moderate size Java programs
  - can write and understand simple recursive code
- This is **not** a course on Java. If you don't know Java, start learning it now, before the programming assignments are due!
  - Books, tutorials on the web, etc.
  - Chapter 1 of our text book (Goodrich&Tamassia) gives a good introduction to Java

# What will you learn?

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- Analysis of moderately complex algorithms
  - How to predict algorithm's performance
    - time and space complexity
  - Algorithm correctness
- Moderately complex data structures that let us efficiently store, access, manage data
- How to solve practical problems efficiently by choosing the appropriate data structures and algorithms

# Topics Covered

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- Analysis of algorithms
  - Time and space complexity
  - Correctness
- Data Structures
  - Dictionaries, hash tables
  - Priority queues and heaps
  - Trees, binary search trees, multi-way search trees
  - Graphs
- Algorithms
  - Binary Search, sorting, algorithms on trees and graphs
- Java Interfaces; Java exceptions

# Contact Info

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- Information

- Lecturers: Lilia Geprgieva and Phil Trinder
- Lectures: Mon 12:15-13:15, Tue 12:15-13:15, Fri 9:15-10:15
- Labs: Fri 13:15-15:15pm
- Office hours: Tue 9:15-10:15am or by appointment

- Lecture Notes

- Will be available on the course web site

# Contact Info

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- Course Web Page
- Check the course web page frequently
- I will post any important announcements on the web page (about homework, exams, etc.)

# Textbook

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- **Main:** *Data Structures and Algorithms in Java, forth edition*, Goodrich and Tamassia, John Wiley & Sons, 2006
- **Supplementary:**
  - *Data Structures and Algorithms with Object Oriented Design Patterns in Java*, Bruno R. Preiss, Wiley, 2000
  - *The Java Programming Language*, Arnold and Gosling, Addison-Wesley, 1996.
  - *Java, an Object Oriented Approach*, Arnow and Weiss, Addison-Wesley, 1999.
  - Other books listed on the course web site

# Class Attendance

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- Not required, but strongly encouraged
  - Lecture notes is only a summary of things happening in class, will not contain many examples
  - Students who attend lectures tend to do better
  - Attending lecture is most efficient way to learn the required material

# Late Policy

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- Assignment extensions may be granted only by the course lecturers
- If you have serious medical or compassionate grounds for an extension, take the supporting documentation to the school's office.

# Ethical Conduct

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- All assignments are to be done individually
- Assignments judged to be the result of academic dishonesty will,
  - First offence = -assignment weight
  - Second offence = failing mark
- We have sophisticated software which will examine your code against everyone else in class

# Email Contact

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- If you send email to lecturers or lab helpers from another account, send a carbon copy (cc) to your university email address. The tutors will respond to your university address.