**HOGESCHOOL ROTTERDAM / CMI**

**Algoritmiek**

**INFDEV01-6A**

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| ECTS: 4  Module responsibles: G. Costantini, F. Di Giacomo |

# Module description

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| **Modulenaam:** | Algoritmiek |
| **Modulecode:** | **INFDEV01-6A** |
| **Aantal studiepunten en studiebelastinguren:** | This course gives you 4 ECTS, which correspond to a study time of 112 hours.  The distribution of these 112 hours is as follows:  Supervised lessons:  - during 8 weeks: 8 \* 100 minutes 13 hours  Unsupervised hours:  - studying of the theory 39 hours  - working on the assignment 60 hours  Total 112 hours |
| **Vereiste voorkennis:** | DEV01-4 |
| **Werkvorm:** | Lectures |
| **Toetsing:** | Written exam; practical assignment |
| **Leermiddelen:** | * Sedgewick, R., & Wayne, K. (2011). *Algorithms* (4th ed.). Addison-Wesley Professional * Online didactic materials |
| **Draagt bij aan competentie:** | Realiseren |
| **Leerdoelen:** | * Je bent bekend met concepten van datastructuren en algoritmen * Je kan fundamentele datastructuren en algoritmes zelf implementeren * Je kan de efficiency van algoritmen (tijd) analyseren * Je kan problemen herkennen en daar het juiste algoritme voor implementeren. |
| **Inhoud:** | Performance analysis, Basic data structures, Sorting algorithms, Advanced data structures (trees, graphs), Path algorithms, Dynamic programming |
| **Opmerkingen:** |  |
| **Modulebeheerder:** | G. Costantini, F. Di Giacomo |
| **Datum:** | 1 November 2015 |

# 1. General description

## Introduction

In this course basic algorithms and data structures are presented.

## Relationship with other modules

Advanced data structures presented in this course are used in RDBMS and informally presented during INFDEV03-5.

In deze onderwijsperiode werk je in project 56 aan een beroepsgerichte opdracht, waar je de kennis en vaardigheden uit deze module direct toepast. Dit project draait om professionele software-ontwikkeling. Bij deze ontwikkeling horen industriestandaard algoritmes. Daarnaast vraag het project om hoge performance bij algoritmes en zijn problemen vaak niet meer op de *naive* / ‘*brute* *force’* strategie op te lossen.

## Learning materials

Mandatory:

* Slides of the lessons (on N@tschool)
* Description of the practical assignment (on N@tschool)
* Sedgewick, R., & Wayne, K. (2011). *Algorithms* (4th ed.). Addison-Wesley Professional

Facultative:

* [MSDN](https://msdn.microsoft.com/en-us/default.aspx) for C#/F#

# Program



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| **Week** | **Topic** | **Book paragraphs** |
| 1 | Arrays;  Complexity of algorithms (empirical analysis, O notation) | 1.4 |
| 2 | Insertion sort; Merge sort | 2.2  1.3 |
| 3 | List, Queue, Stack, Bag; Hash tables | 3.4 |
| 4 | Binary search trees | 3.2 |
| 5 | Balanced search trees: 2-3 search trees | 3.3 |
| 6 | Graphs (undirected, directed, Dijkstra shortest path) | 4.1, 4.2, 4.4 |
| 7 | Dynamic programming; Floyd-Warshall | / |
| 8 | Summary of the course |  |

**Assessment**

## 3.1 Procedure

The assessment is composed by a written exam and a practical assignment.

### 3.1.1 Grading

The final grade is determined by the practical assignment.

The written exam **must** be sufficient () to receive the final grade.

### 3.1.2 Written exam

The exam lasts two lesson hours (100 minutes). No help is allowed during the exam.

### 3.1.3 Practicum

The practical assignment must be done individually.

You must upload your projects on Github and (only at the end) on N@tschool.

The intermediate deadlines will be checked through the *commit*s in Github.

There will be oral checks to verify the authorship of code.

The framework for the assignment comes only for .NET languages: allowed languages are C# and F#.

A detailed description of the practical assignment will be uploaded on N@tschool.

## 3.2 Herkansing

If one part of the assessment is not sufficient (exam and/or practical assignment), then you can repeat that part in the following block.

In week 10 of the following block you can repeat the *written exam*.

The deadline for the *practical assignment* is the end of week 9 of the following block.

**Attachment 1. Assessment matrix**

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|  | **Leerdoelen** | **Vraag** |
| 1 | Je bent bekend met concepten van datastructuren en algoritmen | Tentamen |
| 2 | Je kan fundamentele datastructuren en algoritmes zelf implementeren | Practicumopdracht |
| 3 | Je kan de efficiency van algoritmen (tijd en resource) analyseren | Tentamen, Practicumopdracht |
| 4 | Je kan industriestandaard problemen behorende bij algoritmen herkennen en daar het juiste algoritme voor implementeren. | Practicumopdracht |