

# Master Computer Vision & Data Science

## Additional admission requirements and procedure

Academic year 2024-2025



### Version management

Version Nr.	Date	Changes	Status
2024-2025.01	04-07-2023	First version for recruitment process study year 2024-2025	Discussed and after final changes approved by Management and Programme Committee
2024-2024.02	15-09-2023	Small additional changes in text on advise new Programme Committee	Approved by Programme Committee

## 1. Introduction

The Computer Vision & Data Science master's degree is an ambitious and challenging programme, that in one year prepares students as a professional within the rapidly evolving domain of image data analysis. Admission requirements are applied to assure students have the right knowledge, insight and skills at the start of the programme. During the intake procedure the programme determines whether the prospective master's student meets the required starting level. Make sure you meet the admission requirements when applying for the intake!

NOTE: this document describes all additional admission requirement applied by the master's programme. NHL Stenden as an academy also applies academic admission requirements, like a Bachelor's degree and language requirements for NON-EU/EEA students. These requirements are checked by our Central Student Administration department (CSA) in a parallel procedure. Both the academic requirements and additional requirements need to be met before final admission.

## 2. Additional admission requirements

Besides a bachelor's degree, the following additional qualitative admission requirements apply:

- ✓ demonstrable solid programming skills and the ability to communicate technical work adequately;
- ✓ mathematical knowledge and skills required to understand and explain the principles of computer vision and data science;
- ✓ adequate motivation for a full-time one-year ambitious and challenging programme.

To ensure the quality of the programme we also apply quantitative requirements, being a maximum inflow of 25 students per academic year. The first come - first serve principle is applied, based on following order of registration in studielink.nl.

### 2.1 Indicators

The programme will look at the following indicators in determining whether the additional qualitative admission requirements have been met. The 'Intake form Master Computer Vision & Data Science' provides more information about the evidence used to test each indicator.

- ✓ Scientific Programming – The prospective student is able to communicate technical work adequately and the prospective student is able to use:
  - Debugging tools for Python.
  - Libraries like Numpy and Matplotlib.
  - Virtual environments like Anaconda and package manager like PIP.
  - Operating systems Linux and Windows.
- ✓ Mathematics – The prospective student is able to understand and explain the following concepts:
  - Mathematics: Basic mathematical equations and notations.
  - Linear Algebra: vectors, inner product, matrices, matrix multiplication, inversions, determinant, trace, diagonal, norm, etc.
  - Probability: Gaussian distribution, probability distributions.
  - Statistics: Random variables, mean, variance.
  - Calculus: Derivatives, chain rule.
  - Optional: Eigenvectors and values, spaces, convexity, Bayes theorem, covariance, correlation.
  - Is able to clearly explain mathematical concepts.
- ✓ Motivation – The prospective student is motivated to learn more about the field during an intensive one-year full-time study.

## 2.2 Required level

To give an impression of the required level of scientific programming skills and the required level of knowledge in mathematics we provide the following assignments and tutorials.

- ✓ Scientific Programming – The prospective student should be able to comprehend and solve these assignments without too much effort:
  - [Scientific programming exercises \(ao debugging\)](#)
- ✓ Mathematics - The prospective student should have the mathematical background to be able to comprehend these tutorials:
  - [Neural Networks](#)
  - [Perceptrons](#)
- ✓ Mathematics – The prospective student should be able to learn concepts in the way that they are explained in these tutorials:
  - [Backpropagation Algorithm](#)
  - [Backpropagation](#)

Make sure to study the admission requirements, with provided exercises and tutorials, carefully before handing in your Personal Statement. The additional admission requirements are strict, especially for programming, to help ensure the study ability and successful completion of the programme.

## 3. Admission procedure for additional requirements

A student applies for admission by registering for the master's programme in studielink.nl. After registering the student will receive a letter confirming the admission procedure. During an online intake interview the programme determines whether the prospective master's student meets the required starting level. Several intake days are organized per year – prospective students are invited in order of registration, for as long as seats are still available. All communication within the procedure is in English.

To apply for an intake we ask you to hand in a Personal Statement that contains the following components:

1. Personal Statement with:
  - a. basic information like your name and student number
  - b. your motivation for choosing specifically our master's programme,
  - c. skills/experiences that show you have solid programming skills and mathematical knowledge and skills (examples educational background, work experience, overview of programming languages and libraries you are skilled in, links to papers or code you have published).
2. Programming code (as attachment or link) showing your skills, containing:
  - a. personal code that shows your skills as a programmer,
  - b. the solutions to the Scientific Programming admission assignments (see 2.2).

When the Personal Statement and supplied code meet the basic requirements, the prospective student receives an invitation for an online intake interview. During the intake interview the prospective student is asked some detailed questions about the provided code and is asked to explain some of the mathematical concepts mentioned in the indicators. Goal of the intake interview is to gain further insight in the level of programming experience, mathematical

knowledge and skills in explaining technical work. The 'Intake form Master Computer Vision & Data Science' is used to record the findings during the intake interview (attached).

At the end of the intake, it is determined whether the student is admissible according to the qualitative requirements. If so, subsequently, it is determined whether the student is admissible according to the quantitative requirements. The student will be either qualified as admissible or rejected by the programme. The result of the intake will be communicated with the student within two weeks following the intake interview. The programme will also enter the result in progress (student registration).

To finalize the admission, the student must meet all academic requirements before the start of the academic year, or earlier deadline when applicable (communicated by CSA). The admission procedure is visualized in the flow-chart 'Intake cycle Master Computer Vision & Data Science' (attached).

NOTE: All communication within this procedure is in English.

NOTE: When the Personal Statement doesn't meet the basic requirements after a 48 hour recovery period, the prospective student gets rejected.

NOTE: Not showing up without notice is seen as a lack of motivation and means we will reject your application.

NOTE: When we aren't able to hear you, see you and/or go through your code by your sharing it in the screen, the conference quality is too low to proceed and we will reject your subscription since a prospect student of our programme should master these basic skills.

NOTE: The outcome of the admissions procedure is effective for the academic year of application, with a maximum of two attempts per applicant.

## 4. Applying and contact information

To apply for the intake, please follow the instructions in the cover letter confirming the procedure. For more information about the admission, please contact our coordinator Meintsje de Vries, [cvds@nhlstenden.com](mailto:cvds@nhlstenden.com).

Check our website, movie and project website for more information on our master's programme and projects our students work on.

<https://www.nhlstenden.com/en/courses/computer-vision-data-science-ma>

<https://www.youtube.com/watch?v=5tE5x7x2aPM>

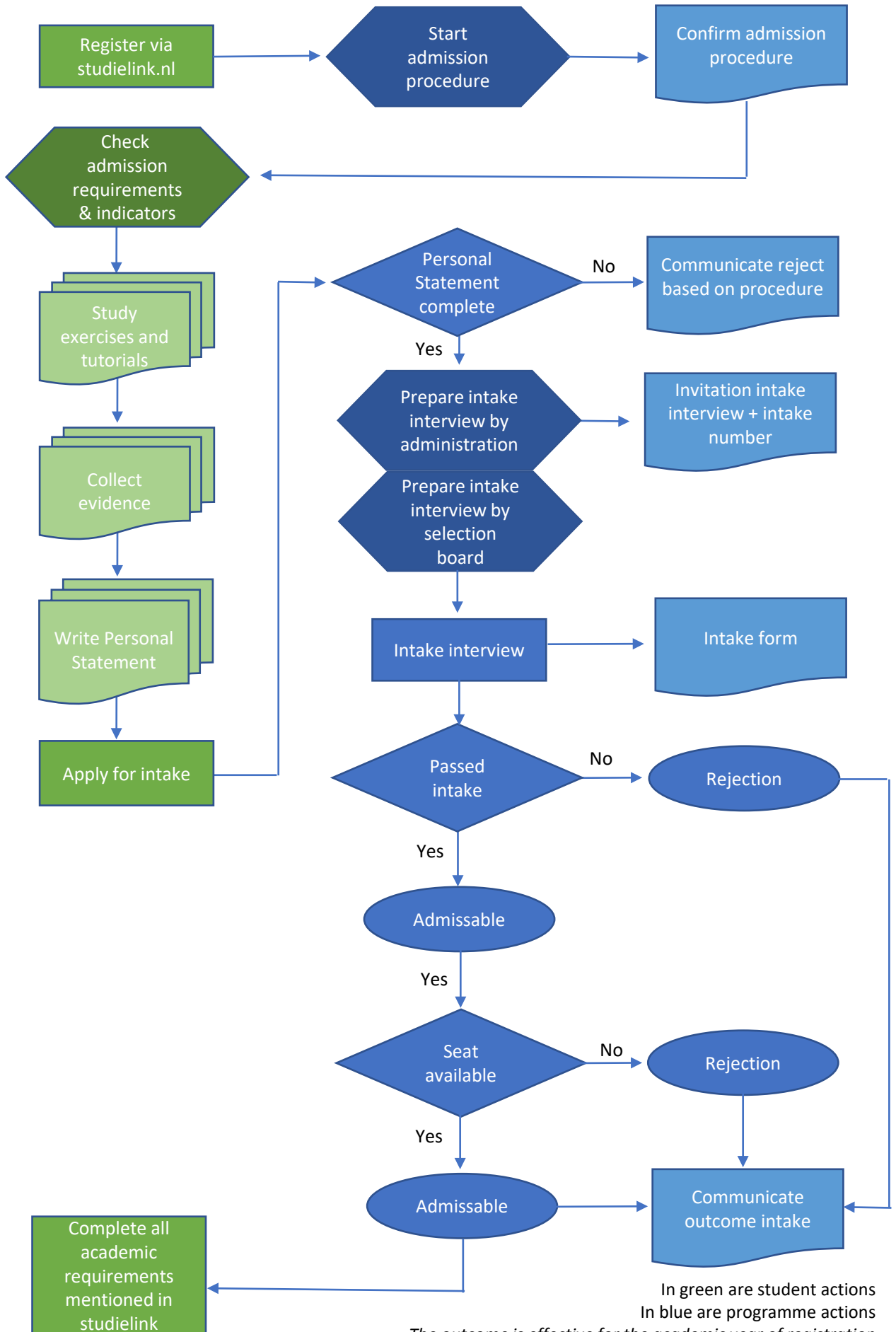
<https://www.cvds-nhlstenden.com/category/projects/>

## 5. Attachments

The flow-chart Intake cycle Master Computer Vision & Data Science and the Intake form Master Computer Vision & Data Science are attached to this document to provide a complete overview.

# Intake Cycle Master CV&DS

Academic Year 2024-2025



In green are student actions  
In blue are programme actions

*The outcome is effective for the academic year of registration*

**Goal**

The Computer Vision & Data Science master's degree is an ambitious and challenging programme, that prepares students as a professional within the rapidly evolving domain of image data analysis. In one year, the Computer Vision & Data Science master's programme will take students into the depths of the domain. Admission requirements are applied to help assure students have the right knowledge, insight and skills at the start of the programme. During an intake the programme determines whether the prospective master's student meets the required starting level. The two team members conducting the intake use this form to record and substantiate their joint judgement.

**Procedure**

The basis for the intake is a Personal Statement that is provided by the prospective student in preparation for the intake interview. Within this Personal Statement the prospective student provides evidence for meeting the additional (programme) admission requirements. During the online intake interview the prospective student is asked some detailed questions about the provided code and is asked to explain some of the mathematical concepts mentioned in the indicators. Goal of the intake interview is to gain further insight in the level of programming experience, mathematical knowledge and skills in explaining technical work. The motivation for application for the master's programme will also be discussed. At the end of the intake, it is determined whether the student is admissible according to the qualitative requirements. If so, subsequently, it is determined whether the student is admissible according to the quantitative requirements. The student will be either qualified as admissible or rejected. The result of the intake will be communicated with the student within two weeks following the intake interview.

**Admission requirements**

In general, the programme wants prospective students to have knowledge and skills in scientific programming and mathematics. Also motivation is an important requirement. The indicators used in determining these requirements are listed in the intake form. The following table elaborates on the evidence used to determine the requirements. All communication within this procedure is in English.

Requirement	Evidence used to prove indicators
Programming experience	Scientific programming experience as mentioned in the Personal Statement and tested during the intake by asking questions about the indicators with the help of the prospective student's own supplied programming code and admission assignments.
Mathematics knowledge	Mathematics knowledge as mentioned in the Personal Statement and tested during the intake by asking questions about the concepts mentioned in the indicators.
Motivation	Demonstrated in the Personal Statement and during the intake interview.

**Instructions for use by column of the intake form**

Column 1	- this column contains the admission requirements and indicators (criteria) on which the prospective student is assessed.
Column 2	- give your judgement here in terms of <ul style="list-style-type: none"> <li>o <b>Insufficient (I)</b>: the provided and demonstrated evidence does not (sufficiently) demonstrate the required level;</li> <li>o <b>Satisfactory(S)</b>: the provided and demonstrated evidence is at an acceptable level, the required level is reached.</li> </ul>
Column 3	- provide a concrete summary and motivate the judgement given by the selection board; - write down concrete and specific findings to support the judgement: <ul style="list-style-type: none"> <li>o for 'Insufficient': indicate which indicators are missing or need development;</li> <li>o for 'Satisfactory': motivate by what evidence the level has been demonstrated.</li> </ul>
	<b>NORM</b> : during the intake all requirements must be demonstrated to satisfactory to be admissible. <b>VALIDITY</b> : the outcome is valid for the 2024-2025 academic year.

Name prospective student: \_\_\_\_\_ Student number: \_\_\_\_\_  
 Intake date: \_\_\_\_\_  
 Names selection board: \_\_\_\_\_ Signature selection board: \_\_\_\_\_

Admission Requirements (with indicators)	Judgement	Motivation of the judgement
<p><b>1. Demonstrable solid programming skills</b></p> <p>The prospective student is able to communicate technical work adequately.                      The prospective student is able to use:</p> <ul style="list-style-type: none"> <li>• Debugging tools for Python</li> <li>• Libraries like Numpy and Matplotlib</li> <li>• Virtual environments like Anaconda and package manager like PIP</li> <li>• Operating systems Linux and Windows</li> </ul>	I / S	
<p><b>2. Mathematical knowledge and skills required to understand the principles of computer vision and data science</b></p> <p>The prospective student is able to understand and explain the following concepts:</p> <ul style="list-style-type: none"> <li>• Mathematics: Basic mathematical equations and notations.</li> <li>• Linear Algebra: vectors, inner product, matrices, matrix multiplication, inversions, determinant, trace, diagonal, norm, etc.</li> <li>• Probability: Gaussian distribution, probability distributions.</li> <li>• Statistics: Random variables, mean, variance.</li> <li>• Calculus: Derivatives, chain rule.</li> <li>• Optional: Eigenvectors and values, spaces, convexity, Bayes theorem, covariance, correlation.</li> </ul>	I / S	
<p><b>3. Adequate motivation</b></p> <p>The prospective student is motivated to learn more about the field during an intensive one-year full-time study.</p>	I / S	

**Outcome: admissible / rejection**