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**Course List (pre-) *MSc Data Science in Business and Entrepreneurship***

In order to be admitted to the Msc Data Science in Business and Entrepreneurship a solid foundation in the following subjects is required:

* Mathematics (5-12 ECTS)
* Statistics (5-12 ECTS)
* Programming (5/6 ECTS)
* Data structures & Algorithms (5/6 ECTS)
* Machine Learning (5/6 ECTS)
* Knowledge of databases (5/6 ECTS)

To assess your eligibility for admission, we require information regarding your prior education. Please include all courses you have completed (or will complete before the start of your (pre-)Master’s program at Tilburg University) as part of your previous degree(s) in the required subject fields of the Course List on the next page(s). Please include the following information:

* course name + course code (both as mentioned on your transcript)
* number of credits for each course
* a course description for each course (in English or in Dutch), describing the main content of the course (covered topics, learning objectives, used literature etc.). You can find a course description in the course catalogue or on the website of your educational institution. Please consult your current study advisor on how to obtain this information. If your current university cannot provide a course description, you can write it yourself. Next to this, please add the URL of the course description in your university’s course catalogue (*mind: not just the URL, please fill in the complete course description on the form itself*).
* In case you already studied or are studying a Master’s program as well, you need to indicate for each course whether it was taken at Bachelor’s or Master’s level.

If you did not complete any courses in a certain subject field, you can leave those rows empty.

Should you have completed more courses in any of the listed fields, please add additional rows for that field.

**Please note that**:

1. These courses must have been part of a degree that you either have obtained or will obtain before you start your (pre-)Master’s program at Tilburg University.
2. If a course covered content of multiple subjects, please list it under its main subject. There is no need to list one course twice or more.
3. We need to be able to find the courses you added in the course list on your Transcript of Records.

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**The following subjects are relevant for admission to the (pre-)MSc Data Science in Business and Entrepreneurship:**

* **Mathematics**
	+ Knowledge of Linear Algebra (e.g. matrices and vectors, solving linear systems with Gauss (-Jordan) elimination, understand and apply rank, orthogonality, (in)dependency, eigenvalue decomposition and eigenvectors, implement linear algebra calculations)
	+ Knowledge of Logic and Set Theory (basic concepts and techniques from set theory, propositional logic, and predicate logic, use them in computations, can provide proofs by induction and perform logical reasoning)
* **Statistics for Data Scientists**
	+ Understand important statistical concepts that form the basis of data analytic methods commonly used in the area of data science (e.g. sampling methods, random variables & distributions, linear and logistic regression, Bayesian statistics)
	+ apply these statistical concepts to solve real-world problems
	+ carry out the necessary calculations in the [R] language for statistical computing
* **Programming**
	+ Understand the programming terminology, concepts, code and structure (e.g. expressions, basic datatypes, functions, debugging)
	+ Able to evaluate code and reason about it
	+ Write maintainable, readable Python (or Java) code that solves (simple) programming problems in a structured way
	+ Interprets requirements and uses a programming environment effectively and efficiently
* **Data structures and Algorithms**
	+ Understand basic algorithms and data structures, selecting the proper one for a given task
	+ Design simple algorithms using different techniques (e.g. incremental algorithms, divide & conquer)
	+ Prove correctness of an algorithm
	+ Analyze algorithms and data structures in terms of efficiency
* **Introduction to Machine Learning**
	+ Define Machine Learning from both a theoretical and business perspective
	+ Summarize and explain the similarities and differences between classification, regression, dimensionality reduction, and clustering
	+ Design a Machine Learning pipeline in the scope of theoretical frameworks for Data Mining
	+ Interpret the performance obtained by a Machine Learning model
* **Foundations of Databases**
	+ Have a basic understanding of (unstructured) data, database management systems
	+ Understand and apply database techniques (relational algebra, SQL, triggers, Views, XML/JSON)

**Example**

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| --- | --- | --- | --- |
| **Subject** | **Course Name:** | **Course Code:** | **Number of credits:** |
| Statistics for Data Science | 1. *Mathematical Statistics*  | *STATS 3012* | *4 credits* |
| **Course Description**: *This course is concerned with the fundamental theory of random variables and statistical inference.* *Topics covered are: calculus of distributions, moments, moment generating functions; multivariate distributions, marginal and conditional distributions, conditional expectation and variance operators, change of variable, multivariate normal distribution, exact distributions arising in statistics; weak convergence, convergence in distribution, weak law of large numbers, central limit theorem; statistical inference, likelihood, score and information; estimation, minimum variance unbiased estimation, the Cramer-Rao lower bound, exponential families, sufficient statistics, the Rao-Blackwell theorem, efficiency, consistency, maximum likelihood estimators, large sample properties; tests of hypotheses, most powerful tests, the Neyman-Pearson lemma, likelihood ratio, score and Wald tests, large sample properties.*EXAMPLE*Literature: 1. Writer, A. , Advanced Statistics for Example Bachelor’s students* *2. Readers during lectures, Manual on Canvas**Bachelor’s level, Example University*<https://www.exampleuniversity.edu/course-outlines/stat3012>  |

*Please note that the final assessment of your application as a whole lies with the Admission Committee. The requirements above are indicative. Your application for the Master’s program will be considered for the Master’s as well as for the pre-Master’s program in Data Science in Business and Entrepreneurship.*

**Please upload the completed course list as a PDF file in Osiris Aanmeld as part of your application.**

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| --- | --- | --- | --- |
| **Subject** | **Course Name[[1]](#footnote-1):** | **Course Code[[2]](#footnote-2):** | **Number of credits[[3]](#footnote-3):** |
| Mathematics | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 3. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Statistics for Data Science | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 3. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Programming | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Data Structures and Algorithms | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 3. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Introduction to Machine Learning | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 3. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Foundations of Databases | 1. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 2. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 3. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| 4. *Name of the course* | *Code of the course* | *Credits* |
| Course Description: *description of the main content and topics covered during the course* |
| Total number of credits obtained during your previous degree: | *Total number of credits* |

Please type your full name and the date you completed the form below. **By doing so, you confirm that you have completed this checklist correctly.** It is your responsibility to ensure that the information is correct and complete.

Full name: ……………………………………………………………………………………………. Date: day/month/year

1. Please write down the name of the course exactly as it appears on your Transcript of Records. [↑](#footnote-ref-1)
2. Please write down the code of the course exactly as it appears on your Transcript of Records. If your Transcript of Records does not feature course codes, you can leave this column empty. [↑](#footnote-ref-2)
3. Please write down the number of credits obtained for the course exactly as it appears on your Transcript of Records. [↑](#footnote-ref-3)