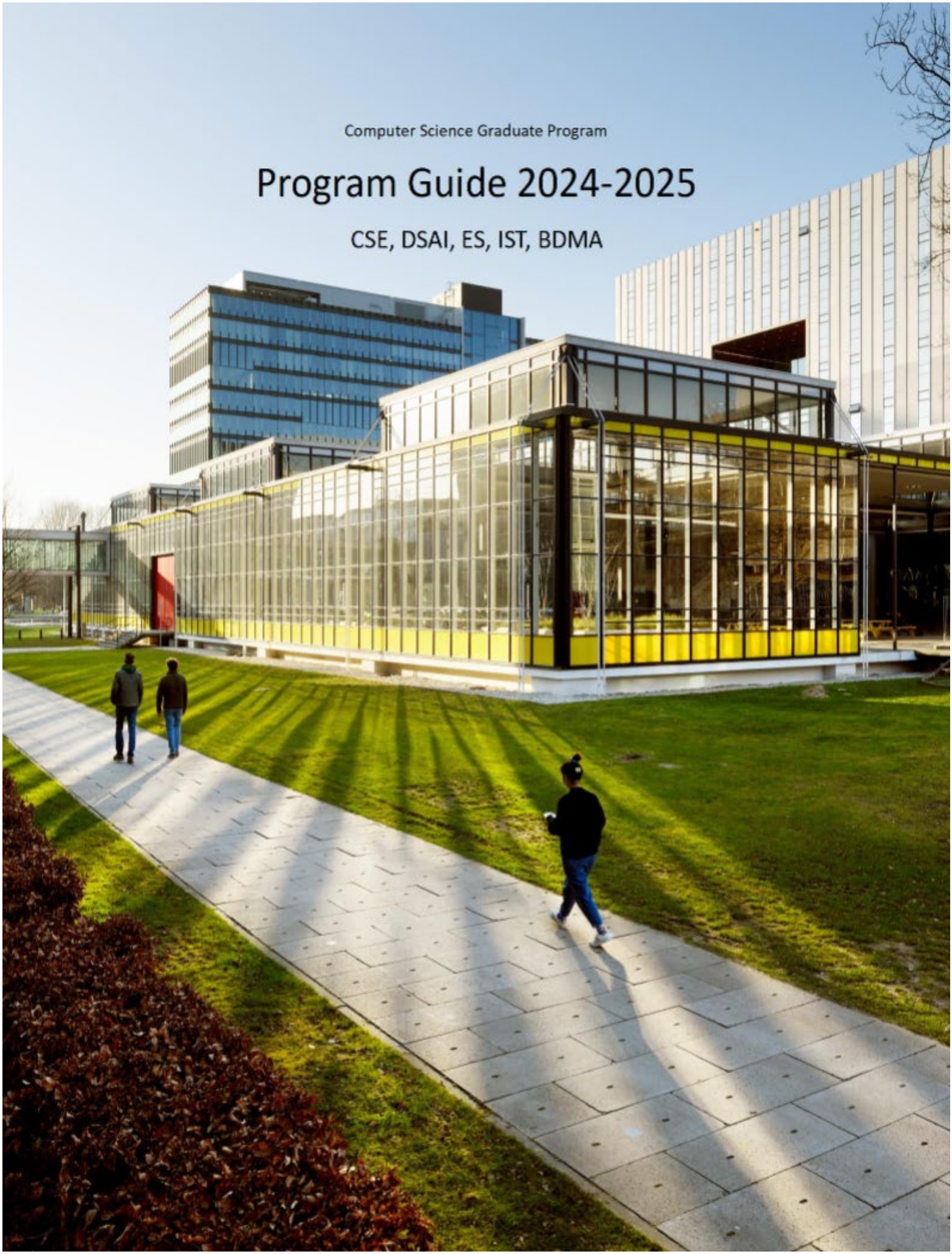
Computer Science Graduate Program

Program Guide 2024-2025

CSE, DSAI, ES, IST, BDMA



TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Computer Science Graduate Program

Program Guide 2024-2025

For master programs CSE, DS&AI, ES, IST, BDMA, and for Pre-Master programs

Computer Science and Engineering
Data Science and Artificial Intelligence
Embedded Systems
Information Security Technology
Erasmus Mundus Joint Master Degree: Big Data Management and Analytics

This document is made for student reference. For official regulations, the Program and Examination Regulations (see Appendix A) are always leading.

Editors: K. MacLeod, S. Linskens
Version: 1.0

Timeline of the Master Program

At the start of your Master:

1. Attend the Intro week on August 19-23 and the Master Department day on August 28.
2. Register for courses before the Quarter 1 (Q1) course registration deadline on August 25.
    a. Tip: A full-time study load is 3 courses per quarter (15 credits). Choose your Q1 courses based on the information in the chapter of your master program, and the advice you got from the academic advisor via email. Furthermore, it is advised to start with foundational/mandatory courses, and homologation courses (if required, see section 1.6.2).

During your Master:

1. Watch out for regular announcements about your program: you will be registered for the Canvas course 2CSE000, 2ES000, or 2AMC99 (for CSE students, ES students, and DSAI students, respectively). Announcements about the program will be posted there. Contact your academic advisor if you haven't been added to the Canvas page by week 2 of Q1.
2. Participate in SCOP/e activities throughout first year. See section 1.7. More details are on the SCOP/e Canvas course 2IMR10.
3. Make a plan for your studies:
    a. Meet with your academic Mentor. In Q1, you will be matched with an academic mentor (a professor in the department). It is recommended to discuss your academic interests with your mentor so they can advise on your course planning.
    b. Questions about curriculum, planning/timing, regulations, or university services? Contact the academic advisor (section 9.3)
    c. Do you want to go abroad for courses or internship? Ideally, you should start organizing this at least 6 months before you would like to go (section 1.6.4)
    d. Turn in your **Program of Examinations**. This lists all the courses you plan to take as part of your degree. (section 1.6.1).
4. Towards the end of your master, do your graduation phase (worth 40 credits). It is made of 2 parts.
    a. Participate in the matching survey to get a supervisor for your graduation phase. This will be posted on the Canvas course 2IMR10 SCOP/e. The matching survey is usually posted at least 6 months before you plan to start your preparation project. Keep an eye on the announcements of 2IMR10 so that you do not miss the matching survey.
    b. Start the preparation project (10 credits), usually in Q2 of your second year (although this is flexible). You get permission to start your preparation project by turning in the **Preparation project form** on 2IMR10 SCOP/e Canvas.
    c. After you defend the Preparation project, start the graduation project (30 credits). You need to have completed all courses and have passed preparation project to be allowed to start. Turn in the **Graduation Plan form** on 2IMR10 SCOP/e Canvas before you start.

As you approach the end of your Graduation Project:

5. Plan the date of your thesis defense ≥ 4 weeks in advance. If you are planning to defend in July or August, it is recommended to start scheduling this 6-8 weeks in advance (if possible) to avoid potential scheduling conflicts with professors during the summer holidays.
6. Check the page of the Education Guide for your program called "administrative processes" to make sure you complete the steps to graduate on time. Here are the links for the various programs: DSAI, CSE, IST, and ES. The steps include:
    a. Making an assessment committee for your thesis defense
    b. Registering for an Exam Committee meeting
    c. Unenrolling from TU/e after graduation.
7. Attend your graduation ceremony and receive your diploma!

Contents

Part I: General Information

1 Studying in the Computer Science Graduate Program

The Department of Mathematics and Computer Science (M&CS) at the Eindhoven University of Technology (TU/e) offers undergraduate (Bachelor of Science), graduate (Master of Science) and postgraduate (PhD, EngD) courses in Computer Science, Data Science and Applied Mathematics.

The CS domain offers its graduate and postgraduate courses in the Computer Science Graduate Program. There are two master programs:

- Computer Science and Engineering (CSE). This master program has a track on Information Security Technology (IST), an interdisciplinary variant in cooperation with the Mathematics Division of the TU/e.
- Embedded Systems (ES), an interdisciplinary master program in cooperation with the Department of Electrical Engineering (EE).

The DS domain offers one master program:

- Data Science and Artificial Intelligence (DSAI). This master program is grounded in two scientific disciplines: data science and artificial intelligence.

The two postgraduate programs are:

- Software Technology, a Master of Technological Design (EngD) program,
- The PhD program.

1.1 Structure of the Master programs

All master programs comprise two years of study or 120 credits. Most courses are standardized to 5 credits per course.

The two years of course work and practical training are divided into four parts, consisting of:

1. Mandatory or Foundational courses to create a sufficient layer of theory and general or program- related knowledge.
2. Specialization and/or elective courses. Depending on a student's interests, there may be a longer or shorter list of electives. These can also be used to prepare for the graduation project. In addition, there is room for free electives.
3. (optional) International experience and or internship. Students who do not have any international experience (a degree from another country or at least 15 credits of credits from a university outside the Netherlands) are encouraged to take courses abroad or to do an internship abroad (Section 1.6.4). Note that international experience is not required.
4. The Graduation Phase (also called Master Thesis) to be spent on a specialist topic of theoretical or practical nature. It should always address an open research question. This part presents the opportunity to show your independent engineering and academic skills in

research and design. (International experience can also be gained by doing the master project abroad.)

The program is designed to be completed within two academic years, although it is not mandatory to graduate within two years.

1.2 Academic calendar and examination schedules

Each academic year is divided into two semesters (September to January and February to July). Each semester consists of two quarters. There are four quarters each academic year, consisting of eight weeks of lectures followed by an examination period of two weeks. Details can be found in the Academic Year agenda in the education guide.

Quarter	Period
1	September 2, 2024 – November 9, 2024
2	November 11, 2024 – February 1, 2025
3	February 3, 2025 – April 19, 2025
4	April 21, 2025 – July 5, 2025
interim	August 11, 2025 – August 16, 2025

1.3 On-campus availability requirement

You are expected to be available and present during all weeks with classes or exams. Some courses may have activities planned during the exam weeks, not yet scheduled before the course starts. Staying in a different city/country during weeks with classes or with exams is not a valid reason for missing an activity.

If severe personal circumstances cause you to miss educational components, please contact your academic advisor (Section 9.3)

1.4 Course and exam registration

Students must register themselves for courses. This is done on OSIRIS. Participation in a course is only possible if you have registered for the course via OSIRIS. Students who wish to de-register from a course should do so on Osiris before the start of the quarter. Questions about course registration and de-registration can be directed to ESA Helpdesk at ESAhelpdesk@tue.nl.

Please note that the course you register for determines the regulations you must follow. If you take a Bachelor College course, Bachelor College regulations apply (even if you are a Graduate School student). This rule is of particular importance for pre-master students and students with assigned or recommended homologation courses. You should consult OSIRIS and check whether the course you intend to take is a Bachelor College course or a Graduate School course. Please keep in mind that students who want to take (a) Bachelor College course(s) as part of the master program, that have not been prescribed/recommended upon admission, should submit a motivated request to the

examination committee. Then the examination committee will decide if the Bachelor College course is allowed to count as part of your Master program.

Registration for a course does not always mean automatic registration for the exam. You should always double-check that you are registered for your exams before the exam registration deadline.

Students at TU/e have two opportunities per year to take an exam for a course. The first is during the examination period of the quarter in which the course was offered. At the end of the following quarter, students who did not pass the first attempt of the exam, or who would like to try to improve the grade they got, can register for another attempt at the exam. This is called a re-sit exam. **Students must register themselves for re-sit exams**.

1.5 Individual support: Advising and Mentoring

The university offers many kinds of support for students. There are two main staff members who you can approach for individual support within the department: the academic advisor and your academic mentor. On a university level, there are other coaches and advisors, which are described in more detail below.

Note that the academic advisors and mentors will not make academic decisions for you; it is your responsibility as a student to design your own program. However, they will guide you along the way and answer your questions.

1.5.1 Academic Advising

The academic advisor is a non-academic staff member who knows the details of your program's curriculum and how the regulations apply to various situations. They can also tell you about the diverse array of resources offered to students at our university.

You can approach your academic advisor with questions about study planning, but also with other topics. For example, if you have a personal issue that is affecting your studies, or simply can't figure out where to start with a question, you can contact the academic advisor They will either help you themselves or refer you to another staff member when necessary. Contact information for the academic advisors is in section 9.3 of this document.

1.5.2 Mentoring

Your Academic Staff Mentor is an academic staff member who is an expert in the field you study. Within the first several weeks of your master program, a mentor will be assigned to you (note that this is not the same as the Student Mentor who you may have met at the Master Kick-off). Your academic mentor can advise you on things like choosing your first electives based on your interests, career development, and your specialization within the master program.

1.5.3 University-wide student support

Central Education and Student Affairs (ESA) also offers a variety of services for students who need more support. There are different types of guidance or counsellors who help on different topics, as well as digital resources and group trainings. Some of the support people and programs are:

- Student psychologists (these are psychologists for students, not students training to be psychologists)
- Study management advisors

- Student counsellors (Studententendecanen) who can advise on legal matters, such as financial assistance
- Confidential counsellors and student ombudsperson
- Career Academy
- And others…

There are also a wellbeing platform and group training sessions. These group trainings are on topics like procrastination, fear of failure, setting goals for your studies, etc. You can find plenty of details about these services, and other support, on the Student Guidance page of the Education Guide.

1.5.4 Extra support during your studies, or studying with an impairment

The university offers resources to students who need extra support with their studies. For example, students who are studying with ASD, AD(H)D, gifted students, students with physical disabilities and also students who are pregnant, caring for children or family members, or students who have TopSport status. The resources and support options are detailed on the education guide page called "Extra support during your studies". You can already indicate that you need extra support when you register for the master program on Studielink.

Note that if a student needs special exam facilities, these need to be arranged many weeks in advance, so you should start as soon as possible. Questions can be directed to your academic advisor (section 9.3) or the student counsellors (section 1.5.3)

1.6 Designing your study: Program of Examinations: choosing courses, etc.

Students are responsible for designing their own study program. "Designing a study program" means choosing the courses that make up your master program. Officially, the list of courses that make up your master is called your Program of Examinations. Designing your Program of Examinations includes selecting courses according to the curriculum of your master program (see Part II of this document), mindfully choosing electives, and choosing a specialization topic for the graduation project.

In the rest of this section you can find guidelines to help you with the process.

1.6.1 Approval of your courses: Form 1 - Program of Examinations

You have some freedom when it comes to which courses and electives to choose. The courses you choose must be approved; each student is responsible for designing their own study program, filling out the Program of Examinations (PoE), also called Form 1, and submitting it for approval. The process for submitting the Program of Examinations is described in the Canvas course 2IMR10 SCOP/e.

It is highly recommended to turn in the form by the end of Q3 of your first year of studies. This way, you can be sure you are taking appropriate courses that will count toward your master degree. You can make changes to your Program of Examinations later if necessary.

Use the curriculum described in the chapter about your program to guide your choices, or you can look directly in the regulations (See Appendix A). Please note that the PlanApp is currently not used for the Master programs; that is only intended for Bachelor programs. If there are questions, you can ask your academic advisor (section 9.3).

1.6.2 Admission with deficiencies: homologation courses

It is possible for students to be admitted with small academic deficiencies. In this case, the admission committee will point this out and assign or recommend (a) bachelor-level course(s) at TU/e to the student to make up the deficiencies. These are called homologation courses. The admission committee will inform the student which homologation courses they should take, if any, in the student's admission letter.

In the DSAI master program, assigned homologation courses must be completed before starting the preparation project of the graduation phase (see section 1.8).

If a DSAI student was assigned a homologation course, but you think one of your bachelor courses already sufficiently covered the topic, you are allowed to request to be exempted from the homologation course within 6 weeks after receiving your admission letter. The process is described in the admission letter which you received by email.

For CSE, IST, and ES students, homologation courses are only strongly recommended, not required. If a CSE, IST, or ES student chooses to take homologation courses, they should be included in the student's Program of Examinations (see Section 1.6.1). When a CSE, IST, or ES student included (a) homologation course(s) in their Program of Examinations, the homologation courses must be completed before the start of the graduation phase (section 1.8).

Embedded Systems students can refer to the related section (section 5.1.6) to learn more about the homologation recommendation tool for the ES program.

Homologation courses count towards the "free electives" part of your master program.

1.6.3 Courses at another Dutch university

In addition to taking courses at TU/e, students can follow courses offered by other universities.

In general, any Master-level course offered at any Dutch university could count towards a student's Master degree, as long as it approved by the Examination Committee. You can get this approval by including the course in your Program of Examinations form and including a link to the course description in the host university's course catalogue (section 1.6.1). It is highly recommended that you seek this approval before taking the course to avoid taking a course that is not approved.

There are also more streamlined ways to register for courses at other Dutch universities: if you register for a course via EUWW, the background administration is taken care of for you. There is also the EuroTeq program, where you can register for a course at a partner university in another European country. Most EuroTeq courses are online courses. For more information on EUWW and EuroTeq, look online.

1.6.4 International experience

Students who do not have a degree or certificate(s) from a university in another country are encouraged (but not required) by the Graduate School to gain international experience during their Master study. Several options are available:

- Take subjects at a university abroad (at least 15 credits)
- Do an internship abroad (at least 15 credits, which is roughly 3 months)
- Do (a part of) the graduation project abroad

Procedures related to obtaining international experience are further detailed on the education guide. (tip: google "international experience tue education guide" for the best link). This includes information about grants and scholarships. There is usually a presentation by the exchange officer in Q2 about going abroad. Keep an eye on the Canvas course 2IMR10 SCOP/e for more information.

Organizing your stay abroad requires careful planning. It is therefore essential that you contact the following offices as early as possible. They will help you make sure you don't miss any steps preparing your international experience:

- Your academic advisor (section 9.3)
- The department's exchange officer: MCS.Exchange@tue.nl

Going abroad is not a valid reason for missing mandatory courses. If you need help, the academic advisor can help you with this academic planning, and either the academic advisor or the department's exchange coordinator can help you find out if the courses you want to take abroad fit into your master program.

You should always discuss your planning with your academic advisor before going on exchange.

1.6.5 Internship or company experience

An internship (15 credits) may be chosen as part of your Master program. It is optional and not a required part of the program. An internship can be carried out in academia or in industry, in the Netherlands or abroad. The objective is to gain experience in your future work field. Please note that this experience can also be gained during your graduation project.

An internship is supervised by an academic staff member at TU/e, called an internship supervisor. This ensures that the internship meets academic criteria. A student has the opportunity to find their own internship and their own internship supervisor; they are not provided to you by the department. We strongly advise that you contact a supervisor at TU/e before you contact a company.

In addition to finding an internship supervisor, the student must also have the internship approved via the Internship Plan form. This can be found on the Education Guide page of your master program.

Questions about the process of doing an internship can be directed to the academic advisor or your mentor.

Students should note that it is <u>not</u> allowed to do both an internship and the graduation phase (section 1.8) in a company. If one is in a company, the other would need to be at TU/e or another educational research institution. A student's internship and graduation phase cannot have the same supervisor.

<u>Internship Rules and Regulations:</u>

- The study load is 15 credits, corresponding to approximately 420 hours of study
- The Internship should fit in the study program, and it should contribute to the learning outcomes of the Master's degree program

- Approval for the internship is requested via the Internship Plan form. This should be submitted before the internship starts.
- The Internship can be done externally (at a company or other university) or internally (at TU/e)
    - Internship and graduation *cannot* both be done in industry. This means that if you do an internship with an external company, your graduation project needs to be done at TU/e.
- A student must have an internship supervisor from TU/e
    - The internship supervisor and graduation supervisor must be different; a student's internship supervisor cannot be the same person as their graduation phase supervisor.
- A student's internship and graduation phase must be on distinct topics.

To see the full list of regulations relating to the internship, see the regulations in Appendix A.

1.7 2IMR10 SCOP/e

SCOP/e stands for Study and Career Orientation Program @TU Eindhoven. This program was designed to guide students in making their study and career choices during their studies at TU/e.

Participation in SCOP/e is mandatory.

The program consists of 2 distinct parts:

- An administrative part
- An activities part

The administrative part ensures students take all the necessary steps to choose the courses in their Program of Examinations and a direction for their graduation phase, and to get the necessary approvals.

The activities part ensures you have all the information you need to make these choices, and to prepare you for the opportunities you have after graduation. It consists of cluster overview presentations, workshops and colloquia. Participation in both parts of SCOP/e is mandatory. More information can be found on Canvas page 2IMR10 SCOP/e.

1.8 Graduation Phase: Preparation project + Graduation project

At the end of your studies, you will do the graduation phase. This is the final part of your master's degree. It is made up of two parts: first you do the preparation project (worth 10 credits) and then the graduation project (worth 30 credits). (Note: Some people informally call the graduation phase the master thesis or master project.)[1]

You are allowed to do the graduation phase at TU/e, in another university or research institution, or at a company. It can be in the Netherlands or abroad. In all cases, you still need a supervisor from TU/e. If you did the 15 credits internship as part of your master program, and it was at a company, you must do the graduation project at TU/e or another university or research institution. The internship supervisor cannot be the same person as the graduation supervisor.

There are certain requirements that you need to meet before starting the preparation project or the graduation project. They are listed below. Please read them carefully.

[1] Students who started in Academic Year 2020 or earlier do not have a preparation project.

1.8.1 Planning and starting the graduation phase

During your graduation phase, you do a research project. In order to prepare for this, there is a "preparation project" worth 10 credits. This consists of a literature review and thoroughly defining the research question that you will work to answer during the rest of your project. This is described in further detail below.

Before starting the preparation project:

- Fill out matching survey. You get allocated to a research group after you submit the matching survey. This survey will be available for you on the Canvas course 2IMR10 SCOP/e when it is time to fill it out. It is important that you keep an eye on the SCOP/e Canvas announcements so that you fill out the survey on time. Usually that is at least 6 months before you plan to start the preparation project.
- If you included homologation courses (section 1.6.2) in your Program of Examinations (section 1.6.1), they must be passed.
- Turn in the Preparation Project start form, according to the directions on the 2IMR10 SCOP/e Canvas page. This form is used by the department to make sure that you meet the requirements to start the preparation project, and check other details.

Timing: Typically, you do the preparation project in the quartile before you start your 30 credits graduation project. It is allowed to start slightly earlier by spreading the 10 credits over two quarters. The preparation project does not need to start exactly at the beginning of the quarter. The timing can be agreed on with your supervisor.

When to start the preparation project and graduation project:

Note that neither the preparation project nor the graduation project need to start at the beginning of a quarter, or end at the end of a quarter; the exact timing is flexible. This is to be discussed with and agreed on with your graduation supervisor. In any case, the preparation project should end when you plan to start the graduation project (30 credits).

During the preparation project:

The preparation project is an individual project of 10 credits supervised by your graduation supervisor. Its objective is to define a concrete graduation project. Together with your supervisor, you decide on your topic and a global planning for the preparation project and graduation project. During the preparation project, you create:

- a precisely defined problem statement,
- an analysis of the state-of-the-art including a thorough literature survey,
- define the expected end result,
- an outline of the planned research and development approach (possibly already supported by some initial theoretical analyses, a small example or case study, and/or some initial experiments),
- a project planning with clearly defined milestones (decision points) and deliverables (results).

At the end of the preparation project:

You present the project proposal report to the intended assessment committee that will also evaluate the graduation project. Sometimes the presentation is done individually with the supervisor instead of with an assessment committee.

The purpose of this preparation project is to ensure that you can begin your graduation project with a well-defined research problem that is feasible to solve in the given context, particularly regarding the availability of required data, context information, and stakeholder objectives.

There are three possible conclusions: you pass the preparation project and continue with the same project for the graduation project; you pass the preparation project but must find a different graduation project; you fail the preparation project, and need to do a new preparation project on a different topic with a different supervisor.

1.8.2 During the Graduation project

After you successfully completed your preparation project you can begin your graduation project (30 credits). You need to submit the Graduation Plan form for approval on time according to the instructions on the 2IMR10 SCOP/e Canvas page.

During the preparation project, you already developed the graduation topic and a project planning together with your supervisor. You now also arrange the supervision method, including how often you and your supervisor will meet to discuss progress.

In general, the graduation project should be completed within 6 months from the start. However, students who work on the project full-time are allowed up to 9 months to finish the graduation project. (This time period refers only the graduation project portion of the graduation phase; it does not include the time you spend on the preparation project.) The minimum duration of the project is 4 months; you are not allowed to defend your thesis until 4 months after the defense date of your preparation project.

1.8.3 Final presentation and thesis defense

The final component of your master program is the final presentation and thesis defense. You must finish all courses and other study components before you defend the thesis. You can discuss arrangements for scheduling the defense with your supervisor as you approach the end of the project.

You complete your graduation project by writing a report about your project and giving a public final presentation. The defense following the presentation, however, is not public; only the student and the assessment committee are present.

For details on what to do as you reach the end of your project, see section 1.9.

1.8.4 Confidentiality

If a student does their master thesis in collaboration with a company, sometimes the company asks the student to sign an NDA or an extensive confidentiality agreement. Students should keep in mind that they must write a master thesis, which cannot be confidential forever. Details about confidentiality agreements can be found on the Education Guide. If you have further questions, contact the academic advisor (section 9.3).

1.8.5 Plagiarism and the thesis

The university takes scientific integrity seriously. During your studies, you will sign the Code of Scientific Conduct. Part of what you agree to in that document is to not commit plagiarism (e.g.,

taking credit for material that is not your own) or scientific fraud (e.g., fabricating data). You can read more about this, and the consequences for committing fraud in section 1.13.1.

1.9 After the project

You need to register for an Examination Committee meeting at the end of your project. This is not a meeting the student attends, but rather a meeting where the Exam Committee checks if you have met all requirements to graduate. Information about this, unenrolling from TU/e, and receiving your diploma are available on the Education guide at the bottom of the Administrative Checklist. Here are the links for each program:

DSAI CSE ES IST

1.10 Honors Program

Two different honors programs are available for excellent students: Research CS Honors and Honors Academy. Students of all Master programs offered by the Computer Science division can apply. Both honors programs are extracurricular, i.e., done on top of the regular Master program. That is, the credits obtained do not count towards the 120 credits you need to accumulate for your Master program.

More information about the Research CS honors can be read below or obtained from the honors programs' coordinators: dr. Kevin Verbeek (k.a.b.verbeek@tue.nl) and for DS&AI, dr. Vlado Menkovski (v.menkovski@tue.nl). Information bout the Honors Academy at is available at honorsacademy@tue.nl. See also the "honors program" page of the Education Guide website.

1.10.1 CS Research Honors

The goal of the program is to give excellent students the opportunity to participate in and contribute to the research being done in the department. Concretely, the Research Honors program consists of:

- Two projects of 6 credits each, one in the third and fourth quartiles of the first year of the Master program and another one in the first and second quartiles of the second year. These projects can be research-oriented or design-oriented and are done in different research groups in the department. The exact content of the projects is determined by the supervisor of the research group where the project is done, in consultation with the student. The expected outcome of the project is a paper (published as a technical report of the department, and possibly also elsewhere).
- Beside the projects, the student participates in other activities of the research group (for example in research seminars) and is encouraged to participate in activities organized by one of the national Dutch research schools (ASCI, IPA, or SIKS). The latter activities are typically short courses or conferences.

Students who successfully complete the Honors program will receive a certificate upon graduation.

Participating in the Honors program is especially useful if you are interested in doing a PhD later on, since it allows you to experience what it is like to do research in two different areas. But above all, the Honors program is challenging and fun.

The program is aimed at highly motivated excellent students (among the top 10% of the Master students in the department) who had outstanding grades in their Bachelor programs and scored high grades during the first semester of the Master program (average at least 8). For admission to the honors program, an application procedure applies.

1.10.2 Honors Academy

Honors Academy is a university-wide program. Any ambitious student can apply, and GPA is not the determining factor in a student's eligibility. It is a 1,5 year program and consists of two interrelated components: Personal Leadership Experience (5 credits) and Professional Development (15 credits). These credits are taken on top of your regular master program. Professional development activities might be related to 'excellence for science', 'excellence for industry' and 'excellence for society'. Examples of such activities can be international or industrial internships, taking courses at other universities or designing a business plan.

You can learn more on the Honors Academy Page of the Education Guide. There you will also find information about the application procedure to the Honors Academy.

1.11 Double degree program with SEC

The qualification to teach to senior secondary school pupils in the Netherlands is offered by the Eindhoven School of Education (ESoE). It is possible to combine a study at ESoE with your master in the M&CS department. Please note that the SEC program is completely lectured in Dutch.

Details about the curriculum are available at the ESoE website: http://www.tue.nl/esoe/.

1.12 Quality assurance & Course surveys

As the end of the quarter approaches, students are asked to fill out a course survey for each course they participated in. It is of vital importance that students participate since only questionnaires with a sufficient number of respondents are taken into consideration.

The students' responses are anonymous and are taken seriously by program management; they are discussed first by the Quality Assurance Officer with the Program Management and later by the Program Committee. Lecturers are asked to read and respond to their course's evaluation as well. Positive course evaluations can help the program understand what teaching practices are beneficial. If a course has particularly negative evaluations, the lecturer should create an improvement plan with their supervisor.

Students can also give constructive feedback in roundtable discussions about specific courses, via the education officer of their Study Association Pattern or GEWIS (section 9.6), or directly to the lecturer of the course.

The opinion of students on the quality of the graduation phase is gathered by means of a graduation questionnaire, which is filled in after the assessment of the graduation project. These are collected and aggregated once a year. The results are discussed both in the Program management and the Examination committee.

1.13 Rules and regulations

Master programs of the department are subject to the following rules and regulations:

- Program and Examination Regulations. This is a legal document describing the master program. Topics covered include admission, structure of the program, testing and final examinations, and transitional arrangements. (Appendix A)

- Regulations of the Examination Committee. Topics covered include exams, fraud, graduation projects, and internships.
- Directive Double Diplomas. These are the regulations for students doing a double degree.

These documents can be found on the Education Guide pages of the master programs.

1.13.1 Academic honesty

Everyone involved in education and research at TU/e bears personal responsibility for observing and maintaining scientific integrity. At TU/e we require strict compliance with the overall principles of professional scientific conduct in all cases. TU/e has its own Code of Scientific Conduct. Please read the code of conduct very carefully: you will be required to sign a declaration stating that you have read it. Carrying out research, design and educational activities, you shall observe the five central values of scientific integrity, namely: trustworthiness, intellectual honesty, openness, independence and societal responsibility, as well as the norms and principles which follow from them.

A particular kind of integrity violation is academic fraud. Fraud includes any behavior or negligence on part of the student that makes it impossible for an examiner to form a correct judgement of the student's knowledge, insight, and skills, or that is aimed at intentionally manipulating the examination process. Examples of fraud include identity fraud (e.g., when a student offers their work to others with the aim, knowledge, or expectation that this work be submitted it as the other student's own work), exam fraud (e.g., using not-allowed materials during an exam), plagiarism (e.g., taking credit for material that is not your own) and scientific fraud (e.g., fabricating data).

In some cases, using AI to generate text (such as with ChatGPT) may be considered as fraud. Talk to the responsible lecturer of your course if you are not sure where the boundaries lie for an assignment.

In cases of fraud, sanctions may be imposed not only on the perpetrator but also on others who are complicit in the fraud. Examples of possible sanctions in case of fraud are denying the student the right to take one or more examinations during a period up to one year or termination of the student's enrollment.

2
Pre-Master Programs

Pre-master programs are designed as a bridging program for HBO students who want to study a university-level Master. Sometimes they are also followed by students with a deviating university (WO) bachelor. Successful completion of the pre-master program grants admission to the corresponding master program.

2.1 Study Progress Requirement

The pre-master programs have only one starting moment (September). The pre-master must be completed within one academic year. This is called the Study Progress Requirement (SPR). If a student does not complete the pre-master in one academic year, they will get a negative advice for the SPR. That means they will not be able to repeat the pre-master, or participate in the related Master program, for three years.

Students who think they will not be able to complete their pre-master courses within one academic year should contact the academic advisor (section 9.3) as soon as possible. Depending on the circumstances, the student may be advised to unenroll from the pre-master. In very exceptional circumstances, they maybe be able to get an extension on the SPR.

2.2 Courses during Pre-Master

Most pre-master students follow a standard curriculum, which can be found later in this chapter. Some pre-master programs have a different curriculum depending on the student's prior education. In that case, the curriculum the student should follow would be indicated in the student's admission letter. If a student has an individualized curriculum, that is also mentioned in their admission letter.

Usually, pre-master students only take courses that are part of their pre-master. However, students that have successfully completed a large part of their pre-master program during the first half-year of their studies, and who would be at a demonstrable disadvantage if they were required to wait for the completion of the pre-master prior to joining the master program, can apply for a special permission of the Examination Committee to follow master study's components. Before requesting this from the Examination Committee, the student must first discuss with the academic advisor (section 9.3). The academic advisor will advise the student on their options and help them submit the request.

The relevant information related to taking extra courses during the pre-master is:

- This idea should be discussed with the academic advisor in advance.
- Students following a 30 credits pre-master program that can be followed within one semester are not eligible.
- Maximum of 15 credits of Master study's components can be approved.
- The eligible courses have to be determined in advance.

- It is not allowed to take extra Bachelor-level courses outside of a student's pre-master curriculum during the enrollment in the pre-master.

2.3 Computer Science and Engineering

The standard pre-master program for a student with a completed polytechnic program in computer science totals to 30 credits and consists of the following units:

Quarter	Course Code	Course name	Credits
1	2WBB0	Calculus variant 2	5
1	2IT60	Logic and set theory	5
1	2IHA10	Formal algorithm analysis for premaster	5
2	2IRR90	Automata and formal languages	5
2	2ID50	Data modeling and databases	5
2	2DRR00	Linear algebra and applications	5

2.4 Information Security Technology

The standard pre-master program for a student with a completed polytechnic program in computer science totals to 30 credits and consists of the following units:

Quarter	Course Code	Course name	Credits
1	2WBB0	Calculus variant 2	5
1	2IT60	Logic and set theory	5
1	2WF90	Algebra for security	5
2	2DRR00	Linear algebra and applications	5
4	2IC80	Lab on offensive computer security	5
4	2IRR40	Security	5

2.5 Embedded Systems

The standard pre-master program for a student with a completed polytechnic program in computer science or similar totals to 30 credits and consists of the following units:

Quarter	Course Code	Course name	Credits
1	2DL10	Premaster calculus and probability	5
1	5EPC0	Circuits	5
1	2IT60	Logic and set theory	5
2	5LIU0	Premaster linear systems, signals and control	5
2	5EZA0	Math 1	5
4	5XIE0	Computational modeling	5

The standard pre-master program for a student with a completed polytechnic program in electrical engineering or similar totals to 30 credits and consists of the following units:

Quarter	Course Code	Course name	Credits
1	2DL10	Premaster calculus and probability	5
1	2IT60	Logic and set theory	5
2	5LIU0	Premaster Linear systems, signals & control	5
2	5EZA0	Math 1	5
2 or 3	2INC0	Operating systems	5
4	5XIE0	Computational modeling	5

2.6 Data Science and Artificial Intelligence

The pre-master program of DS&AI is decided on a case-by-case basis by the Admission Committee. A student's curriculum is described in their admission letter, which is sent by email.

Part II: Master Programs

3 Computer Science in Engineering

The CSE Master program is a research-oriented master on Computer Science and Engineering, to which all clusters in the Computer Science and Data Science domains of the Department of Mathematics and Computer Science contribute by means of courses and graduation assignments. The CSE curriculum consists of a broad range of advanced courses offered by the researchers within these clusters. The courses span a broad range of the following topics: algorithms, databases, formal methods, internet of things, data mining and machine learning, artificial intelligence, process analytics, security, (embedded) software engineering, system and software architecture, and visualization.

3.1 Curriculum

The CSE Master curriculum is structured according to three focus areas: Algorithms & Theory, Architecture & Systems, and Software & Analytics. Each of these focus areas is captured by a set of foundational courses and deepening courses. These focus areas are described later in this chapter.

You obtain breadth in research by selecting a foundational course from each focus area and specialize in one of the focus areas by selecting additional foundational or deepening courses. In the second half of your studies, you participate in one of the research seminars, bringing you to the forefront of research in your chosen direction.

Specifically, the 120 credits of the CSE Master are allocated as follows. Further explanation is below the table.

CSE curriculum component	Credits
Foundational courses	15
Specialization (in one focus area)	15
CSE Specialization electives	30
Free electives	15
Seminar	5
Graduation Phase (preparation project + graduation project)	10+30
TOTAL	***120***

To compose your study program, choose one foundational course from the focus area Algorithms & Theory, one foundational course from the focus area Architecture & Systems, and one foundational course from the focus area Software & Analytics (15 credits in total). That fulfills the “Foundational courses” part of the curriculum. In addition, choose three more courses (foundational or deepening) from *one* focus area (15 credits in total). That is the “Specialization (in one focus area)” portion of the program. The list of “CSE Specialization electives” is later in this chapter.

3.1.1 Focus areas

This section describes the foundational and deepening courses of each Focus area. You can use this information to choose your Foundational courses (15 credits) and Specialization (in one focus area) courses (15 credits).

Algorithms & Theory: A deep mathematical understanding of computation and semantics is indispensable for reasoning about the quality and efficiency of algorithms, data structures and (concurrent) systems. This focus area thus encompasses, for example, improving and understanding trade-offs between algorithm efficiency and quality, exploring, and pushing the limits of computation, modelling and (manually, mechanically or fully automatically) verifying computational and/or concurrent systems. The courses for Algorithms & Theory focus area are as follows:

Quarter	Course code	Course name	Credits
Foundational			
1	2IMA10	Advanced Algorithms	5
1	2IMF25	Automated Reasoning	5
4	2IMF10	Process Algebra	5
Deepening courses			
1	2IMA50	Algorithms for collective decision making	5
2	2IMA15	Geometric Algorithms	5
2	2IMA35	Massively Parallel Algorithms	5
3	2IMA20	Algorithms for Geovisualization	5
3	2IMA25	Exact Algorithms for NP-hard Problems	5
3	2IMF15	Proving with Computer Assistance	5
4	2IMA30	Topological Data Analysis	5

Architecture & Systems: Modern digital systems involve complex interactions between various hardware and software components operating under functional and non-functional requirements. This focus area addresses the understanding and management of the architecture, interactions, behavior, and trade-offs in such systems. In particular, it focuses on the theory and practice for the modeling, design, implementation, analysis and verification of complex networked, embedded, large-scale and data-intensive systems. The courses for Architecture & Systems focus area are as follows:

Quarter	Course code	Course name	Credits
Foundational			
1	2IMN10	Architecture of Distributed Systems	5
1	2IMF30	System Validation	5
2	2IMD10	Engineering of Data-Intensive Systems	5
Deepening courses			
2	2IMF35	Algorithms for Model Checking	5
2	2IMN15	Internet of Things	5
2	2IMN20	Real-time Systems	5
3	2IMN25	Quantitative evaluation of Cyber Physical Systems	5

Software & Analytics: Software is a key enabler in Computer Science. The development of software should be efficient and result in high-quality software. This focus area addresses the development of high-quality software in an efficient way. It does so by providing knowledge on developing correct software by construction and by combining principles and methodology of software development with analysis of information sources, specifically by mining software repositories to understand the effects of software evolution. The courses for Software & Analytics focus area are as follows: *[see table on next page]*

Quarter	Course code	Course name	Credits
Foundational			
1	2AMI10	Foundations of Process Mining	5
2	2IMP10	Program Verification Techniques	5
3	2IMP25	Software Evolution	5
Deepening courses			
1	2AMM20	Research Topics in Data Mining	5
2	2IMP40	Empirical Methods in Software Engineering	5
2	2IMP60	Human-Computer Interaction	5
3	2IMN30	Machine Learning for Industry	5
3	2AMD15	Big Data Management	5
4	2IMP30	System Design Engineering	5
4	2IMP20	Domain Specific Language Design	5

3.1.2 CSE Specialization electives

30 credits of your program are made of "CSE Specialization electives". These can either be more courses from any of the Focus area courses, or courses from the list below. Furthermore, it is also possible to do an internship for this section, subject to relevance and approval by the Examination committee (section 1.6.5). This approval should be requested in advance. If you would like to request to use international experience (courses or an internship abroad) as CSE specialization electives, please discuss this with your academic advisor. More information about the internship can be found in Part 1 of this document.

Quarter	Course code	Course name	Credits
1	2IMS10	Physical aspects of digital security	5
1	2IMS25	Principles of data protection	5
1	2IMD20	Language Virtual Machines Design and Implementation	
2	2DMI20	Software security	5
2	2IMS20	Cyberattacks, Crime and Defenses	5
3	2AMM15	Machine Leaning Engineering	5
3	2IMS15	Verification of security protocols	5
3	2IMS30	Advanced Network Security	5
3	2IMV10	Visual computing project	5
3	2IMS40	Intrusion Detection Lab	
4	2AMM10	Deep Learning	5
4	2IMP15	Software project management	5
4	2IMV15	Simulation in computer graphics	5
4	2IMS50	Introduction to quantum computing and security	5
(Year)	2IMC10	Internship [1]	15

[1] *Subject to approval and relevance. The student can only start an internship (2IMC10) with permission of the Examination Committee*

Capita Selecta courses are occasional educational elements, often with a research flavor. When included, capita selecta courses are part of the CSE specialization electives. They may be experimental courses, a lecture series given by a visitor, or a special individual assignment as a preparation on future research. The capita selecta can be followed only by permission of the

responsible lecturer. Students do not have a "right" to do these courses, but they may be granted the possibility. Further questions about the capita selecta can be directed to the academic advisor.

3.1.3 Free electives

To compose the 15 credits free electives part of your study program you can choose courses to broaden your horizon from:

- Other TU/e programs
- Other universities
- CSE or focus area foundation or deepening courses

In principle, all master courses offered at the TU/e can be chosen as free electives. Taking other mathematics and computer science related courses is recommended, as well as computer science related courses from other universities (provided their topics do not overlap with the TU/e courses you already take). You can also take EWUU, EuroTeq, or international exchange courses (see sections 1.6.3 and 1.6.4). **Remember that the courses you choose must be approved** (section 1.6.1).

Note that if you have homologation courses (section 1.6.2), these are part of your free electives. It is also possible to include up to 15 credits of bachelor-level courses as part of your free electives. Note that any homologation courses contribute to this 15 credits maximum. If you want to take bachelor-level courses as part of your master's degree, but they were not assigned to you as homologation courses, this should be discussed with your mentor and your academic advisor, and must be approved by the examination committee. It is recommended to request this approval well in advance of taking the bachelor course(s).

3.1.4 Seminar

CSE students are required to take a seminar. This is meant to help prepare you for the graduation project. Therefore, it is recommended to do the seminar in the field that you would like to do your graduation project in. Some research groups require you to have done their seminar to graduate with them, while others don't. (A summary of the research groups in the department can be found on the Education Guide, see Chapter 8).

You should be in at least the 4th quarter of your master program before you take a seminar. Below you will find a list of seminars for CSE students.

Quarter	Course code	Course name	Credits
1	2IMI00	Seminar Process Analytics	5
1	2IMV00	Seminar Visualization	5
2	2IMD00	Seminar Data Management	5
2	2IMM00	Seminar Data Mining	5
2	2IMU00	Seminar Uncertainty in AI	5
4	2IMF00	Seminar Formal System Analysis	5
4	2IMN00	Seminar Interconnected Resource-aware Intelligent Systems (IRIS)	5
4	2IMP00	Seminar Software Engineering and Technology	5
4	2IMA00	Seminar Algorithms	5
4	2IMS00	Seminar Information Security Technology	5

3.1.5 Graduation Phase

The graduation phase is worth 40 credits. It is made of the preparation project (10 credits) and the graduation project (30 credits). You do not need to register for the Preparation project or Graduation Project in Osiris. (Note: Some people call the graduation phase or graduation project the "master project" or "master thesis". This is mentioned here to avoid confusion.)

Students usually start the preparation project in the 5th or 6th quarter of their studies, followed by the graduation project in the 7th and 8th quarters. The Preparation project must be completed before the start of the graduation project. If homologation courses are chosen, then they must be completed before the start of the preparation project.

Please see section 1.8 for details on the Graduation Phase.

3.2 End of your Master – Administrative Processes

The Administrative Process page of the Education Guide website provides you with a step-by-step guide for the administrative steps you should follow at the end of your project to smoothly graduate from the program and unenroll from TU/e.

4 Information Security Technology

A Master of Science in Information Security Technology (IST) is an academic expert in the area of information security in general, and in computer & network security in particular. Information security technology protects data that are stored, transmitted, accessed, or modified against all kinds of threats. Threats can vary from unauthorized access to malicious manipulations. Information security technology is essential for secure communication and data protection in many situations.

A Master of Science in Information Security Technology can become involved in cryptographic primitives, security protocols, data storage, communication, or information security management. Additionally, they can act as internal or external consultant, regarding the security of information systems and networks, or regarding the security policy of an organization. A Master of Science in Information Security Technology can enter a job in (among others) the following institutions: research laboratories and academic institutes (both for theoretical and applied work); applied R&D in industry; the financial world; governmental agencies; consultancy agencies (all with respect to security in the area of information systems and relevant policy making).

After taking some courses, you will probably have a clearer picture of the academic direction you want to pursue in your studies. If not, you may want to talk to several staff members, your mentor, or the academic advisor. In the specialization for your subject, there are people that you may want to be involved with for your final graduation phase. In order to compose a well-balanced program that provides adequate prerequisites for this project, it is advisable to first choose and consult a project supervisor in the specialization of your interest (or a representative of the group in which you think you might like to graduate) before choosing elective courses.

4.1 Curriculum

The Master track Information Security Technology is a two-year program of 120 credits in total. The program is only offered as a full-time study program, so students should take on average three courses per quarter. (If you want to regularly take fewer or more courses each quarter, you should talk to the academic advisor (section 9.3))

The 2024 IST curriculum has the following format:

IST curriculum component	Credits
Mandatory courses	30
IST Stream electives	15
IAM and CSE elective courses	20
Free electives	15
Graduation Phase (preparation project + graduation project)	10+30
TOTAL	***120***

(Note: if you started in a different academic year, you can see the Program and Examination Regulations from your start year. That is by default the curriculum you follow.)

4.1.1 Mandatory courses

The table below shows the core courses that make up the foundation of the IST program. For more information about the course, check the Osiris course catalogue.

Mandatory courses (30 credits):

Quarter	Course code	Course name	Credits
1	2IMS25	Principles of data protection	5
1	2MMC10	Cryptology	5
2	2DMI20	Software Security	5
2	2IMS20	Cyberattacks, crime and defenses	5
3	2IMS30	Advanced network security	5
4	2IMS00	Seminar IST	5

It is recommended to take the mandatory courses in your first quartiles, rather than waiting until the second year. For example, a student who starts in Quarter 1 would take 2IMS25, 2MMC10, and one stream elective (or homologation course) in their first quarter.

The exception is the seminar: students who start the master program in the second semester should take the seminar closer to the start of their graduation phase.

4.1.2 IST Stream Electives

At least three courses (15 credits) need to be taken from the list of IST Electives; you do not need to take all these courses. If you want to take more than three of these courses, they can count in the other categories of electives

IST Stream electives (15 credits needed):

Quarter	Course code	Course name	Credits
1	2IMS10	Physical aspects of digital security	5
2	2DMI10	Applied cryptography	5
3	2DMI00	Cryptographic protocols	5
3	2IMS15	Verification of security protocols	5
3	2IMS40	Intrusion Detection Laboratory	5
4	2IMS50	Introduction to quantum computing and security	5

4.1.3 IAM and CSE courses

20 credits of the IST program is made up of electives from the list of courses from the Computer Science in Engineering master track (can be foundational, deepening, or specialization courses), or the courses from the Industrial and Applied Mathematics Master program. The CSE courses are listed in Chapter 3. A list of IAM courses can be found in the Program and Examination Regulations (Appendix A). An internship (15 credits) (section 1.6.5) can also count towards this section.

4.1.4 Free Electives

To compose the 15 credits free electives part of your study program you can choose courses to broaden your horizon from:

- Other TU/e programs
- Other universities
- CSE or focus area foundation or deepening courses

In principle, all master courses offered at the TU/e can be chosen as free electives. Taking other mathematics and computer science related courses is recommended, as well as security-related courses from other universities (provided their topics do not overlap with the TU/e courses you already take). You can also take EWUU, EuroTeq, or international exchange courses (see sections 1.6.3 and 1.6.4). **Remember that the courses you choose must be approved** (section 1.6.1).

Note that if you have homologation courses (section 1.6.2), these are part of your free electives. It is also possible to include up to 15 credits of bachelor-level courses as part of your free electives. Note that any homologation courses contribute to this 15 credits maximum. If you want to take bachelor-level courses as part of your master's degree, but they were not assigned to you as homologation courses, this should be discussed with your mentor and your academic advisor, and needs to be approved by the examination committee. It is recommended to request this approval well in advance of taking the bachelor course(s).

4.1.5 Graduation phase

The graduation phase is worth 40 credits. It is made of the preparation project (10 credits) and the graduation project (30 credits). IST students can do their graduation phase with a computer science research cluster or with the Coding and Crypto group from the discrete mathematics cluster. You do not need to register for the Preparation project or Graduation Project in Osiris. (Note: Some people call the graduation phase or graduation project the "master project" or "master thesis". This is mentioned here to avoid confusion.)

Students usually start the preparation project in the 5th or 6th quarter of their studies, followed by the graduation project in the 7th and 8th quarters. The Preparation project must be completed before the start of the graduation project. If homologation units are chosen, then they must be completed before the start of the preparation project.

Please see section 1.8 for details on the Graduation Phase.

4.2 End of your Master – Administrative Processes

The Administrative Process page of the Education Guide website provides you with a step-by-step guide for the administrative steps you should follow at the end of your project to smoothly graduate from the program and unenroll from TU/e.

5 Embedded Systems

The design of innovative software and hardware is the core of technological and industrial progress. Both the departments of Mathematics and Computer Science and Electrical Engineering play an active role in the development of new, innovative technology. The Master of Science program in Embedded Systems at the TU/e is illustrative of this active role, as it is a co-production of these two departments, awaiting students with a background in computer science, as well as graduates from the field of electrical engineering.

The program rests on a sound theoretical foundation, with emphasis on the design of quality embedded systems. As a graduate of this program, you will have developed a scientific attitude and an engineering approach to the field. Your position will be the design of embedded systems from a high-level architecture viewpoint, via requirements and behavioral specifications and using platforms, hardware, and silicon. You will be able to play a leading role in the development of embedded systems, either in scientific research, in industry or governmental organizations.

The Embedded Systems program focuses on the design of reliable and resource-efficient (e.g., energy, computational and network resources) systems. For this you need knowledge of algorithms, performance, software-hardware integration, methods of design, validation, testing and documentation, and an insight into the variability and maintainability of these protocols. All these aspects are addressed in the compulsory part of the program. The Embedded Systems program at the TU/e is offered in close collaboration with Delft University of Technology (TUD) and the University of Twente (UT) in the context of the 4TU federation.

5.1 Curriculum

The master program on Embedded Systems is a two-year program of 120 credits in total. The curriculum consists of courses offered by the Computer Science division of the department Mathematics and Computer Science and the department of Electrical Engineering.

ES curriculum component	Credits
Mandatory courses	25
Stream mandatory courses	15
Stream electives	15
Free electives	25
Graduation Phase (preparation project + graduation project)	10+30
TOTAL	***120***

The curriculum has a core of 25 credits consisting of five courses that are mandatory for all Embedded Systems students. The curriculum is further structured into four streams. Students choose one stream and follow its courses. The streams are:

- Systems on Chip
- Embedded Software
- Embedded Networking
- Cyber-Physical Systems

In the following sections, more details for each of the streams are given.

The purpose of the streams is, on the one hand, to provide guidance to students in composing coherent study programs, and on the other hand, to preserve the multidisciplinary nature of each individual Embedded Systems study program. Each stream is made of a mandatory part of 15 credits and a stream elective part of 15 credits. Each stream has its own list of stream electives.

The graduation project of the Embedded Systems program consists of a 10 credits preparation project and a 30 credits graduation project. The remaining 25 credits of the program may be composed of free electives.

Students are encouraged to consider including international experience (courses or research in another country) as part of their program. However, this is not required.

5.1.1 Mandatory courses

The following are the mandatory courses of the Embedded Systems program

Quarter	Course code	Course name	Credits
1	2IMF30	System Validation	5
2	5SIA0	Embedded Computer Architecture	5
2	2IMN20	Real-time Systems	5
3	2IMN25	Quantitative evaluation of Cyber Physical Systems	5
4	5LIB0	Embedded Systems Laboratory	5

5.1.2 Systems on Chip Stream

Modern chips are rapidly evolving into complete Systems on Chip (SoCs). The emergence of SoCs leads to new challenges in VLSI design, design automation, programming and code generation, task and communication mapping and scheduling, memory management, and model-driven design-space exploration. This stream addresses the design of SoCs with special attention for the various design trade-offs and formal verification techniques to support correct design.

Students who choose this stream must take all its Mandatory courses, and at least 15 credits of its Stream elective courses. Additional stream electives can be taken, which will count as free electives.

Quarter	Course code	Course name	Credits
Stream Mandatory courses			
1	2IMF25	Automated Reasoning	5
2	5LIH0	Digital Integrated Circuit Design [1]	5
4	5LID0	Systems on Silicon	5
Stream Elective courses [2]			
1	5CCA0	Semiconductor physics and materials	5

[table continued on next page]

[table continued from previous page]

Quarter	Course code	Course name	Credits
2	2IMNT1	Embedded computer architectures 2[3]	5
2	5LIG0	Applied Combinatorial Algorithms	5
2	5LIF0	Advanced Digital Circuit Design	5
3	5LIL0	Intelligent Architectures	5
3	5LIE0	Multiprocessors	5
3	5LIM0	Parallelization, Compliers and Platforms	5
3	5SIB0	Electronic Design Automation	5
3	5LIJ0	Embedded Control Systems	5
4	5LIA0	Embedded Visual Control	5
4	2IMF00	Seminar Formal System Analysis	5

1 *It is forbidden to include both of the following courses as part of your Master program of examinations: 5LIH0 Digital integrated circuit design and 5LIP0 Digital integrated circuits: fundamentals.*
2 *At least 15 credits of this list of stream electives have to be chosen.*
3 The course 2IMNT1 is offered by TU Twente in Enschede. Secondary enrollment at the TU Twente is required to take the course.

5.1.3 Embedded Software stream

The behavior and functionality of embedded systems is largely determined by the software that it runs. This stream focusses on the development of embedded software addressing aspects such as model-driven design, domain specific languages, code generation techniques, and formal techniques to solve scheduling problems.

Students who choose this stream must take all its Mandatory courses, and at least 15 credits of its Stream elective courses. Additional stream electives can be taken, which will count as free electives.

Quarter	Course code	Course name	Credits
Stream Mandatory courses			
1	2IMF25	Automated Reasoning	5
3	5LIM0	Parallelization, Compilers and Platforms	5
4	2IMP30	System Design Engineering	5
Stream Elective courses[1]			
1	2IMN10	Architecture of Distributed Systems	5
2	2DMI20	Software security	5
2	2IMP10	Program Verification Techniques	5
2	5LIG0	Applied Combinatorial Algorithms	5
2	2IMF35	Algorithms for Model Checking	5
3	2IMP25	Software Evolution	5
3	5LIE0	Multiprocessors	5
3	5LIJ0	Embedded Control Systems	5
3	5LIL0	Intelligent Architectures	5

[table continued on next page]

[table continued from previous page]

Quarter	Course code	Course name	Credits
4	2IMP20	Domain Specific Language Design	5
4	5LIK0	Embedded Signal Processing Systems	5
4	2IMF00	Seminar Formal System Analysis	5
4	2IMN00	Seminar Interconnected Resource-aware Intelligent Systems (IRIS)	5
4	2IMP00	Seminar Software Engineering and Technology	5

1 *At least 15 credits of this list of stream electives have to be chosen.*

5.1.4 Embedded Networking stream

Embedded Networking (EN) refers to the powerful trend of the last twenty years of connecting embedded systems into networks. For electronic systems in automotive, for example, the network is often the point of integration. More recently we have seen the concept of the Internet of Things, the vision that everyday objects get enriched with embedded electronics, that these objects are uniquely identified and communicate using a unified protocol and naming scheme. EN includes the fields of sensor networks, but also networked systems that represent a platform and are not identical to the application. From the sensor network domain, concerns of effective resource management (like size, energy, memory, communication bandwidth) are derived. Quality metrics for EN include performance (latency, throughput), dependability (quality of service) and scalability. Besides these, EN challenges lie in the architecture of system and software, in management and sharing of distributed resources, in interoperability and semantics, in security and privacy, and in application development. While it is fairly easy to sketch advanced applications, it is not straightforward to realize these in a cost-effective manner. Relevant topics for this stream are distributed systems (architecture and protocols), networked systems, data semantics, network security, system correctness, and resource management.

Quarter	Course code	Course name	Credits
Stream Mandatory courses			
1	2IMN10	Architecture of Distributed Systems	5
1	5LIC0	Networked Embedded Systems	5
2	2IMN15	Internet of Things	5
Stream Elective courses[1]			
1	2IMF25	Automated Reasoning	5
2	5LIH0	Digital Integrated Circuit Design	5
2	5LIF0	Advanced Digital Circuit Design	5
2	2IMS20	Cyberattacks, Crime and Defenses	5
3	2IMS30	Advanced Network Security	5
3	2IMS15	Verification of Security Protocols	5
3	5SIB0	Electronic Design Automation	5
4	5LIK0	Embedded Signal Processing Systems	5
4	5LIA0	Embedded Visual Control	5
4	5LID0	Systems on Silicon	5
4	2IMP30	System Design Engineering	5
4	2IMF00	Seminar Formal System Analysis	5
4	2IMN00	Seminar Interconnected Resource-aware Intelligent Systems (IRIS)	5

1 *At least 15 credits of this list of stream electives have to be chosen.*

5.1.5 Cyber-Physical Systems stream

Cyber-Physical Systems are characterized by a tight coupling between embedded computer (cyber) systems and physical processes, monitored and controlled by those computer systems. Cyber-physical systems require integral, multidisciplinary design, involving computer engineering, control, mechatronics, networking, signal processing, and mathematical modelling. The stream focuses on the control and signal processing aspects of cyber- physical systems.

Quarter	Course code	Course name	Credits
Stream Mandatory courses			
2	2IMN15	Internet of Things	5
3	5LIJ0	Embedded Control Systems	5
4	5LIK0	Embedded Signal Processing Systems	5
Stream Elective courses[1]			
1	5CSA0	Modeling Dynamics	5
1	2IMN10	Architecture of Distributed Systems	5
1	5LIC0	Networked Embedded Systems	5
2	5LIG0	Applied Combinatorial Algorithms	5
2	5LIF0	Advanced Digital Circuit Design	5
2	5LIV0	Video Health Monitoring	5
3	2IMP25	Software Evolution	5
3	5LIM0	Parallelization, Compilers and Platforms	5
3	5LIE0	Multiprocessors	5
3	5LIL0	Intelligent Architectures	5
3	5SIB0	Electronic Design Automation	5
4	5LIA0	Embedded Visual Control	5
4	2IMP30	System Design Engineering	5
4	2IMP20	Domain Specific Language Design	5

1 *At least 15 credits of this list of stream electives have to be chosen.*

5.1.6 Free electives

To compose the 25 credits free electives part of your study program you can choose courses to broaden your horizon from:

- Other TU/e programs
- Other universities
- More courses from the Embedded Systems curriculum
- An internship (section 1.6.5)

In principle, all master courses offered at the TU/e can be chosen as free electives. In particular, we would like to encourage you to include SFC640 Academic Writing in English as one of the free electives. Note that you must take a placement test with the language center before you can register for SFC640. You can also take EWUU, EuroTeq, or international exchange courses, or do an internship (see sections 1.6.3, 1.6.4, and 1.6.5). **Remember that the courses you choose must be approved** (section 1.6.1).

Note that if you have homologation courses (section 1.6.2), these are part of your free electives. If an Embedded systems student was suggested to take a homologation course in their admission letter,

it is not required that the student follows the course, but it is highly recommended. Students are also recommended to test their own background knowledge with the homologation recommendation tool. If you do not know how to access the homologation recommendation tool, contact the academic advisor.

While you are encouraged to focus on Master courses, it is also possible to include up to 15 credits of bachelor-level courses as part of your free electives. Note that any homologation courses contribute to this 15 credits maximum. If you want to take bachelor-level courses as part of your master's degree, but they were not assigned to you as homologation courses, this should be discussed with your mentor and your academic advisor, and needs to be approved by the examination committee. It is recommended to request this approval well in advance of taking the bachelor course(s).

5.1.7 Graduation Phase

The graduation phase is worth 40 credits. It is made of the preparation project (10 credits) and the graduation project (30 credits). ES students can do their graduation phase with Computer Science or with Electrical Engineering. You do not need to register for the Preparation project or Graduation Project in Osiris. (Note: Some people call the graduation phase or graduation project the "master project" or "master thesis". This is mentioned here to avoid confusion.)

Students usually start the preparation project in the 5th or 6th quarter of their studies, followed by the graduation project in the 7th and 8th quarters. The Preparation project has to be completed before the start of the graduation project. If homologation units are chosen, then they must be completed before the start of the preparation project.

Please see section 1.8 for details on the Graduation Phase.

5.2 End of your Master – Administrative Processes

The Administrative Process page of the Education Guide website provides you with a step-by-step guide for the administrative steps you should follow at the end of your project to smoothly graduate from the program and unenroll from TU/e.

6
Data Science & Artificial Intelligence

As the name of the program implies, the MSc Data Science & Artificial Intelligence (DS&AI) program is grounded in two scientific disciplines: data science and artificial intelligence. The main aim of the program is to educate Masters of Science in engineering who are able to combine advanced data analytics techniques and AI methods in order to understand, apply and create systems that behave intelligently and extend human intelligence in a responsible, transparent, and explainable way.

We strongly believe that society needs experts who can support and enhance our human capabilities to solve complex problems, gain deeper understanding, and achieve results that were not attainable before in a trustworthy and explainable way, by analyzing (large amounts of complex) data and representing, analyzing, and reasoning over (domain) knowledge using the structured skills, techniques, and the deep knowledge and understanding of Data Science methods with the state-of-the-art methods of AI.

The DS&AI program has the ambition that DS&AI graduates are Data Scientists and AI Engineers with the ethos of a "civil engineer," having deep technical abilities in the above expertise areas to develop smart solutions (instead of brute forcing) that

- are robust, trustworthy, fair, and secure,
- work together with people (not instead of),
- include the human factor in the process and in the result, and
- turn data into value under technical, social, and ethical aspects.

Hence the core content of the intended DS&AI program is the combination of its two underlying scientific disciplines, data science and artificial intelligence together with ethics and challenge-based learning. Data Science studies all principles and techniques of collecting, storing, managing, preparing, processing, analyzing, and visualizing data. Artificial Intelligence studies all principles and techniques for supporting and augmenting intelligent behavior. These two disciplines create knowledge from data and intelligence from knowledge.

There are many different areas within Data Science & Artificial Intelligence that support this process. The Master's program DS&AI is organized around six areas, each containing three to four coherent courses within the program. These areas are:

- Data Engineering and management
- Algorithmic Data Analysis
- Statistics
- Process Mining and Visual Analytics
- Data Mining and Machine Learning
- AI and Machine Learning

Through ethics and challenge-based learning, students integrate their skills from the different expertise areas in various real-life contexts, providing reflection on their methodology and way of working as an AI Engineer.

6.1 Curriculum

The Master program Data Science & Artificial Intelligence is a program of 120 credits in total, intended to be completed in two years. It is possible to enter the program at the start of either semester; however, starting in February is not advised and will most likely lead to a study delay. If you want to start in February, it is advisable consult with the academic advisor to discuss your academic planning. The program is only offered as a full-time study program. However, it is possible to study at a different pace, taking fewer courses per quartile. Again, this should be discussed with the academic advisor (section 9.3).

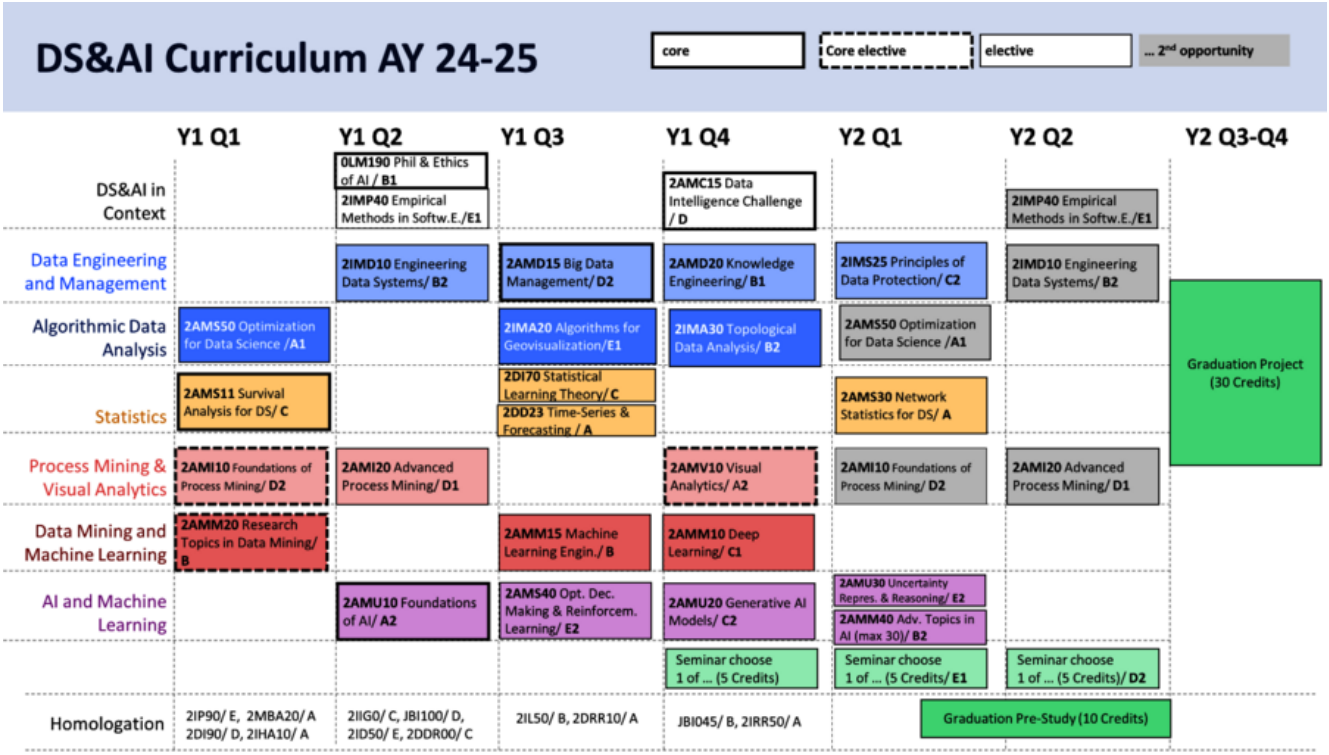
6.1.1 Program Composition

The DS&AI Master is structured into trajectories. Each trajectory contains a set of 2-4 coherent courses that go from foundational knowledge to advanced expertise. The image on the next page shows the different types of courses and their scheduling. (Note that 2AMM40 has a capacity/enrolment limit, at least in academic year 2024-2025.) You compose your program of examinations by:

- Following all core courses in the trajectories of the program (30 credits)
    - 25 credits of mandatory core courses *(bold lined course in the table below)*
    - 5 credits of elective core courses *(bold, dashed lined courses)*
- Choosing specialization courses (30 credits) from the trajectories in the form of
    - 2 trajectories you declare as your major trajectories (10 credits per major trajectory). *It is recommended to refrain from declaring both AI & Machine Learning and Data Mining & Machine Learning as your major electives.*
    - 1 or 2 more trajectories you declare as your minor trajectories (10 credits total)
        1. 1 trajectory with 10 credits, or 2 trajectories 5 credits each
- Choosing free electives (15 credits)
- Completing your program with the graduation phase (45 credits) *(green courses)*
    1. 5 credits seminar
    2. 10 credits preparation project
    3. 30 credits graduation project

[see image on next page]

This image illustrates the curriculum that was described on the previous page:



It should be noted that each course can only be used once in a student's curriculum. For example, 2AMI10 Foundations of Process Mining could be used as either a core elective, *or* a major trajectory course, *or* a minor trajectory course *or* as a free elective; a student cannot use a course in multiple places in their program to meet multiple requirements.

6.1.2 Trajectories

The DS&AI program is divided into seven trajectories, listed here. These are described in further detail below.

1. Data Science & Artificial Intelligence in Context (general trajectory)
2. Data Engineering and Management
3. Algorithmic Data Analysis
4. Process Mining and Visual Analytics
5. Statistics
6. Data Mining & Machine Learning
7. AI & Machine Learning

Trajectories number 2 through 7 can be elected as major or minor trajectory.

Data Science & Artificial Intelligence in Context: When working as an engineer in Data Science & Artificial Intelligence, you will identify and solve societal and technical problems. The problems you face will present themselves, not in a clearly defined technical manner as taught in the technical trajectories, but rather, you will encounter them in the context of an existing organization or system where specific stakeholders such as citizens, workers, customers, patients, farm animals, or wildlife face a problem. Your obligation as an engineer is to understand this context, it's requirements and objectives and the different aspects and objectives that define what desirable and undesirable

solutions are. More often than not, you will see that the problem and its objectives are different than initially presented to you by stakeholders in the light of available data; that data is incomplete or insufficient. You will also see that objectives from different stakeholders and context constraints contradict each other, both in being achievable through technical solutions, but also in their impact on the stakeholder and the context: a solution that works seemingly well according to various technical quality criteria may have potentially disastrous consequences for users, or people affected by this solution.

As an Engineer in Data Science & Artificial Intelligence, you must be aware of all the requirements and objectives of the problem you are aiming to solve, taking the full context into account.

Data Engineering and Management: We live increasingly in a data-driven world. Data and data analytics play a central role not only in technical systems but also broadly in organizations and society, across government, academia, and industry, and both in private and public spaces. We are awash in massive complex data collections containing tremendous untapped value.

Data Management Systems (DMS) provide the fundamental underlying infrastructure to identify and realize this value. DMS provide for the end-to-end care, maintenance, and use of data towards revealing actionable insights into big data. Data-intensive systems consequently must address a broad range of basic scientific challenges, such as efficient scalable human-data interaction, explainable and secure data storage and access, knowledge modeling and extraction, and scalable data analytics for data science and artificial intelligence applications. DMS are responsible for efficiently and effectively addressing all of these intertwined challenges which are widespread in today's data-driven science and organizations.

Algorithmic Data Analysis: Algorithms play a fundamental role in Data Science: they enable efficient automated data handling, analysis and visualization. Typical data-science problems are often time-sensitive and complex, and not even necessarily well-defined. To develop algorithmic solutions for such challenges which deliver high- quality results in a verifiable, and hence also explainable, manner, a broad set of algorithmic tools is a necessary and important part of the repertoire of each data scientist.

Process Mining and Visual Analytics: The courses in this trajectory teach you techniques to explore and integrate various kinds of complex data by designing problem-specific visualization pipelines for data summarization, feature engineering, and hypothesis generation and evaluation (2AMV10). You will learn how to analyze data from more than one viewpoint, revealing new features and properties that are crucial for better data understanding and learning behavioral models (2AMV10, 2AMI20). You will learn how to construct highly explainable behavioral models and process models that we call glass-box models through unsupervised learning that visually describe any kind of behavior (processes) in an easily understandable manner (2AMI10, 2AMI20). On the example of process models, you will learn to adopt a mindset of evaluating models not just in terms of aggregate errors measures but along various quality dimensions including precise diagnostic information that can explain the quality of the model for each data point (2AMV10, 2AMI10, 2AMI20), and how to use the diagnostic information for improving model quality (2AMI20). The course 2AMU30 Uncertainty Representation and Reasoning from the "AI & Machine Learning" trajectory cover this topic from the angle of Machine Learning and Artificial Intelligence.

Statistics: Statistical analysis aims to understand relevant characteristics of (sub)populations or phenomena that are described by the collected data. This field of data science and artificial intelligence contains a wealth of statistical models and techniques that can summarize data into

understandable statistical quantities and features that have direct impact and interpretation to real-world situations. It contains methods that may help in collecting data (e.g. survey sampling, experimental design), modeling data (e.g. time-series, linear, non-linear, and generalized mixed models, survival and reliability), and exploring or learning from data (e.g. clustering analysis, discriminant analysis, resampling). The field characterizes itself by its capability of analyzing complex data sets and properly describing or addressing the inherent uncertainty (data collection variabilities, measurement errors, incompleteness, outliers, heterogeneities, systematic biases) in the observed data.

Choosing the appropriate statistical method for the analysis of a specific data set requires knowledge, experience, skill, and practice. For large and complex data sets there are often many different ways that a data set can be approached, and it is imperative that the strengths and weaknesses of the statistical analyses are known to the user for the tasks at hand. In large and complex data sets it is impossible to address in a statistical analysis all the different data aspects present in a data set, since statistical methods may not always be rich enough to capture all these aspects. Knowing what aspects of the data in combination with the statistical models and methods can be ignored or treated as nuisance is an important part of statistical analysis.

Data Mining & Machine Learning: Data mining and machine learning study foundations and practical approaches for knowledge discovery from vast collections of complex data. This knowledge may come in the form of patterns, descriptive, predictive and prescriptive models.

This trajectory focuses on data mining and machine learning approaches and techniques for developing end-to-end solutions for algorithmic decision making. These are so pervasive today that you probably use them dozens of times a day without knowing it, for instance in web search, speech recognition, and a variety of mobile phone applications. It is also a crucial component of data-driven industry, scientific discovery, and modern healthcare. One of the fascinating aspects of data mining and machine learning is that they automate the process by learning from examples rather than being explicitly programmed. We, as engineers, come up with approaches for meta-programming. That is, we develop intelligent computer programs that can learn to induce new useful programs from the training examples.

AI & Machine Learning: Artificial intelligence and machine learning involve the study of algorithms that improve through experience. The fields cover topics that are essential towards obtaining agents with some type of intelligence, including knowledge and learning representations, model learning from data, reasoning and planning under uncertainty, causality, language processing, signal and vision, and often make use of core methods and techniques from optimization, statistics, probability, algorithmic development, and so on. This trajectory explores AI and machine learning from multiple angles on principles of AI, theories of representation, AI models, algorithms for learning, reasoning and decision making. There is also an important focus on solutions that are not only accurate but efficient, reliable, interpretative, robust and trustworthy.

6.1.3 Free Electives

There are 15 credits of free electives in the DS&AI curriculum. Homologation courses (Section 1.6.2) count towards your free electives. Otherwise, you can use electives to broaden your horizon with:

- Other courses in the DS&AI curriculum
- Recommended DS&AI electives (see below)
- Master-level courses from other TU/e programs
- Other universities

- Capita selecta
- Internship (15 credits, see section 1.6.5)

In principle, all master courses offered at the TU/e can be chosen as free electives. Taking other mathematics and computer science related courses is recommended, as well as computer science related courses from other universities. You can also take EWUU, EuroTeq, or international exchange courses, or do an internship(see sections 1.6.3, 1.6.4, and 1.6.5). **Remember that the courses you choose must be approved** (section 1.6.1).

Note that if you were assigned any homologation courses (section 1.6.2), these are part of your free electives. Next to assigned homologation courses, it's possible to include bachelor-level courses in your program as part of your free electives, but only if these courses provide you with necessary prior knowledge for core courses, core electives or major/minor trajectory electives. Homologation courses and bachelor-level courses within your program cannot exceed 15 credits. If you want to take bachelor-level courses as part of your master degree, but they were not assigned to you as homologation courses, this should be discussed with your mentor and your academic advisor, and needs to be approved by the examination committee. It is strongly recommended to request this approval well in advance of taking the bachelor course(s), because it is not guaranteed that it will be approved. It is not allowed to take a seminar as a free elective unless you have special approval.

The following courses are recommended free electives for DS&AI:

Quarter	Course code	Course name	Credits
Any	SFC640	Academic Writing[1]	5
Any	2IMC10	Internship	15
Any	2IM..05	Capita Selecta[2]	5
Any	2MMR40	Research Topic 1[2]	5
Any	2MMR50	Research Topic 2[2]	5
Any	2MMR60	Research Topic 3[2]	5
1	8DM50	Machine learning in medical imaging and biology	5
1	5ARA0	Software engineering for artificial intelligence	5
1	5ARB0	Data acquisition and analysis	5
1	7ZU4M0	Econometric analysis of housing markets: data, tools and strategies	5
1	2IMA10	Advanced Algorithms	5
1	2IMF25	Automated Reasoning	5
2	2IMA35	Massively Parallel Algorithms	5
2	5SSD0	Bayesian Machine Learning and information processing	5
2	DBM180	Designing with advanced artificial intelligence	5
2	4SC000	Optimal control and reinforcement learning	5
3	0HM340	Human-AI Interaction	5
3	2IMN30	Machine Learning for Industry	5
3	DBM190	Designing with and for digital twins: A data-driven design perspective	5
4	5SC28	Machine Learning for Systems and control	5
4	5LSL0	Machine Learning for signal processing	5
4	1BM120	Decision making with artificial intelligence	5

1 It is required to take a placement test with the Language Center before being allowed to register for SFC640.

2 The capita selecta can be followed only by permission of the responsible lecturer. Further questions about the capita selecta can be directed to the academic advisor.

6.1.4 Seminar

Students should take 1 seminar from the list below.

Quarter	Course code	Course name	Credits
1	2IMI00	Seminar Process Analytics	5
1	2IMV00	Seminar Visualization	5
1	2AMS00	Seminar Statistics Probability and Operations Research (SPOR)	5
2	2IMM00	Seminar Data Mining	5
2	2IMD00	Seminar Data Management	5
2	2IMU00	Seminar Uncertainty in AI	5
4	2IMF00	Seminar Formal System Analysis (FSA)	5
4	2IMP00	Seminar Software Engineering and Technology (SET)	5
4	2IMN00	Seminar Interconnected Resource-aware Intelligent Systems (IRIS)	5
4	2IMA00	Seminar Algorithms	5
4	2IMS00	Seminar Information Security Technology (IST)	5

6.1.5 Graduation phase

The graduation phase is worth 40 credits. It consists of the preparation project (10 credits) and the graduation project (30 credits). You do not need to register for the Preparation Project or Graduation Project using Osiris. (Note: Some people call the graduation phase or graduation project the "master project" or "master thesis". This is mentioned here to avoid confusion.)

If you were assigned any homologation courses (Section 1.6.2), they must be completed before the start of the preparation project.

Students usually start the preparation phase in the 5th or 6th quarter of their studies , followed by the master project in the 7th and 8th quarters. The Preparation project has to be completed before the start of the graduation project.

Please see Section 1.8 of this document for details on the Graduation Phase.

6.2 End of your master - Administrative Processes

The Administrative Process page of the Education Guide website provides you with a step-by-step guide for the administrative steps you should follow at the end of your project to smoothly graduate from the program and unenroll from TU/e.

7
Erasmus Mundus Joint Master Degree: Big Data Management and Analytics

Students following the Big Data Management and Analytics Master program can do the second year of their master program at TU/e to specialize in Business Process Analytics. It is not possible to switch to BDMA from one of the other Master programs of Computer Science at TU/e. Details about the program are available on the BDMA website.

The following table summarizes the BDMA specialization program at TU/e:

Quarter	Course Code	Course Name	Credits
1	2AMI10	Foundations of process mining	5
1	2AMR10	Responsible data challenge	5
1	2IMI00	Seminar process analytics	5
2	2AMI20	Advanced process mining	5
2	2AMC05	Graduation preparation	10
3+4	2IMC00	Graduation project	30

If BDMA students have questions about their program, they can contact the academic advisor (section 9.3) or the BDMA Program Manager, dr. Renata Medeiros de Carvalho.

Part III: Organization and Regulations

8
Research Groups

There are different research groups associated with the master programs. There are more details about each group on the Education Guide. Here are the links to the appropriate page for:

- DSAI
- CSE
- IST
- ES (CS/DS groups or EE groups)

At the above links, each group provides a short description of their research area and mentions some courses that are relevant for students who are interested in their research. The courses are not meant to be obligatory for candidate graduates, but they are highly recommended and give an impression of the academic predispositions of the staff. You can check which groups offer the courses you have enjoyed most and use this information when choosing a research group for your graduation project. The contact person mentioned may give you additional information.

All master courses offered by the Computer Science department start with 2IM, or 2AM for Data Science, followed by a letter representing a research group, as follows:

A: Algorithms, Geometry and Applications
C: Courses not specific for a research group such as internship or master project,
D: Databases
F: Formal System Analysis
I: Process Analytics
M: Data Mining
N: Interconnected Resource-aware Intelligent Systems
P: Software Engineering and Technology
S: Security
U: Uncertainty in AI
V: Visualization

9 Academic Administration

9.1 Education and Student Affairs (ESA)

The Education and Student Affairs helpdesk is your contact point for general information and inquiries about tuition and financing, admissions, enrollment at TU/e, course registration, exam regulations etc.

Location: first floor of MetaForum

Email for course enrollment topics: ESAhelpdesk@tue.nl

Email for all other topics: ESA@tue.nl

Phone: 040 247 4747

9.2 Departmental Student Administration (CSA)

You can contact the departmental student administration with your forms, questions about graduation or your diploma, transcripts, statements on expected graduation, and other topics.

Email: MCS.CSA@tue.nl

Office: MetaForum 3.090

CSA desk is open: Monday-Friday 12:00-14:00 (closed during some holidays or summer break)

9.3 Academic Advisor

The academic advisor is a non-academic staff member who knows the details of your program's curriculum and how the regulations apply to various situations. They can also tell you about the diverse array of resources offered to students at our university.

You can approach your academic advisor with questions about study planning, but also with other topics. For example, you can contact them if you have a personal issue that is affecting your studies or simply can't figure out where to start with a question. They will either help you themselves or refer you to another staff member when necessary.

You can reach them by:

- Email
- Making an appointment (links below)
- Drop-in (contact academic advisor for your program's weekly drop-in hours)

Contact info:

Program:	**Name and email address:**
DS&AI:	Jet Verbeeten and Katie MacLeod Email: MCS.Academic.Advisor.DSAI@tue.nl Appointment link: click here

CSE, IST, ES, BDMA: Angie Lammen and Sofie Linskens

Email: MCS.Academic.Advisor.MCS@tue.nl

Appointment link: click here

All Pre-Master Programs: Katie MacLeod

Email: MCS.Academic.Advisor.Premaster@tue.nl

Appointment link DSAI: click here

Appointment link CSE/IST/ES: click here

9.4 Examination committee

The Departmental Board appoints an Examination Committee for each program. There is one for CS master programs combined: CSE, ES and IST and one for DS&AI. The Examination Committee is responsible for organizing and coordinating the examinations, and for appointing examiners.

When a student has a request related to the Program and Examination Regulations, they make that request through the Examination Committee. The process is as follows: The student should contact the academic advisor about their request. The academic advisor then advises the student on the request and directs the student Osiris Case ("Osiris Zaak" in Dutch) to make a request to the Examination Committee.

9.5 Program Committee

The program committee (PC) is appointed by the Department Board, and it has the following tasks:

- to advise the program director and the Department Board on issues relating to the Program Examination Regulations (PER)
- to annually evaluate the implementation of the PER
- to advise on all issues relevant to the academic program

9.6 Study Associations: GEWIS and D.S.A. Pattern

The Study Associations also play an important role for students and the quality of education in the master programs. If students have comments or concerns, they can contact the study association.

GEWIS is the study association for mathematics and computer science students at TU/e. GEWIS can be reached at: MF 3.155, phone number (040) (247) 2815, the website http://www.gewis.nl, and e-mail: board@gewis.nl.

D.S.A. Pattern is the study association for all Data Science students at TU/e, Tilburg University (TiU), and the Jheronimus Academy of Data Science (JADS, Den Bosch). D.S.A. Pattern is located in MF3.061 at TU/e. There are also Pattern locations at TiU and JADS. Pattern can be reached at: phone number (040) (247) 8464, the website https://dsapattern.nl/ and email: info@dsapattern.nl.

9.7 Information resources

Current information on program regulations, program changes, changes in the course schedules, practical courses, exams, and other important matters is available as listed below.

Leading information on the program:

- The Program and Examination Regulations (see Appendix A).

Personal contact at the department:

- Academic Advisors (see section 9.3)
- Student Administration (CSA) (see section 9.2)
- International exchange coordinator: MCS.Exchange@tue.nl
- The Study Associations GEWIS and Pattern (see section 9.6).

Several sources of information are available online:

- The website https://www.tue.nl/en/ provides general TU/e information.
- Information about the department, academic counseling, etc. can be found on the Education Guide https://educationguide.tue.nl/
- The course catalogue can be accessed at https://tue.osiris-student.nl/#/onderwijscatalogus/extern/start?taal=en and contains current course information. Also, examinations and course schedules are available at there.
- Information about TU/e Online systems: https://educationguide.tue.nl/practical-info/it-services/online-systems/?L=2
- Directive Double Diplomas. These are the regulations for students doing a double degree. The details can be found on the Education Guide: https://studiegids.tue.nl/opleidingen/internal-double-diploma/master-programs
- Timeslots for courses are explained here: https://educationguide.tue.nl/practical-info/time-slots

Appendix A
Program and Examination Regulations

The Program and Examination Regulations (PER) is a document that contains all the information on education and examination for a program. This includes the content of the program (curriculum) and the testing within the program. The PER for all master programs can be found at the following link:

https://educationguide.tue.nl/practical-info/regulations-codes-of-conduct-and-guidelines/program-and-examination-regulations-per/?L=2

To supplement the PER, the examination committees have made the Regulations of the Examination committee. This document clarifies and specifies details of the regulations within a program. The Regulations of the Examination Committee for your master program can be found on the Education Guide page of your master program.