

**Systems & Control**  
MSc Programme

Study guide  
2006/2007

[www.masteryourfuture.nl](http://www.masteryourfuture.nl)

**TU Delft**

Delft University of Technology

## Disclaimer

This guide has been compiled with the utmost care by the Faculty. There are a number of items about which further information will only become available after this guide has been published. For this reason the information published in this guide can be subject to change. Changes, additional information and more detailed course descriptions are available on Blackboard: [blackboard.tudelft.nl](http://blackboard.tudelft.nl) and/or on the SIS website: [www.tudelft.nl/sis](http://www.tudelft.nl/sis).

## Table of contents

2	>	Disclaimer
3	>	Table of contents
5	>	Personal details
6	>	Faculty Preface
7	>	Academic calendar 2006/2007
9	>	TU Delft – University Facts and Mission
9	>	International Office
10	>	Service Desk
10	>	Blackboard
11	>	Schedules
11	>	TU Delft Library
12	>	Regulations
18	>	Map of TU Delft
22	>	1. MSc Systems and Control
22		1.1 Goal
24		1.2 Educational concept and assessment
25		1.3 Study programme and general structure
25		1.4 Admission to the programme
29		1.5 MSc Systems and Control
37		1.6 Enrolling for modules and tests
38		1.7 Pass rules and criteria for 'Cum Laude'
39		1.8 Honours track
39		1.9 Study and internship abroad
40		1.10 Profile of the Systems and Control graduate
42	>	2. Faculty
42		2.1 Delft Centre for Systems and Control
43		2.2 Education and Student Affairs
45		2.3 Education Committee
46		2.4 Board of Examiners
46		2.5 Student society
47		2.6 Student guidance
49		2.7 Working conditions, RSI and harassment
51		2.8 Quality control

52	2.9 Information services
52	2.10 Faculty regulations
55 >	3. Facilities
55	3.1 Lecture rooms / meeting rooms
55	3.2 Individual study facilities
55	3.3 Computer rooms
56	3.4 Research facilities
58	3.5 Lecture notes and books
59	3.6 Catering
60 >	4. Course descriptions
60 >	5. Course and Examination Regulations / Regulations and Guidelines for the Board of Examiners



## Personal details

name \_\_\_\_\_

address \_\_\_\_\_

postal code / city \_\_\_\_\_

telephone \_\_\_\_\_

mobile \_\_\_\_\_

e-mail \_\_\_\_\_

### NOTIFY IN CASE OF EMERGENCY:

name \_\_\_\_\_

address \_\_\_\_\_

postal code / city \_\_\_\_\_

country \_\_\_\_\_

telephone \_\_\_\_\_ mobile \_\_\_\_\_

### MEDICAL INFORMATION:

medications \_\_\_\_\_

allergies \_\_\_\_\_

passport no \_\_\_\_\_

blood group \_\_\_\_\_

organ donor: yes / no; card no: \_\_\_\_\_

If found, please return this student guide or contact the owner.

## Faculty Preface

The MSc programme Systems and Control is directed towards the analysis and design of reliable and high-performance measurement and control strategies for a wide variety of technological dynamical processes. The programme is executed by the Delft Center for Systems and Control (DCSC), a merging of three former systems and control groups of electrical engineering, mechanical engineering and applied physics. This Center is housed at the Faculty of Mechanical, Maritime and Materials Engineering.

This programme has been set up to bring together students from a variety of backgrounds in engineering interested in studying systems and control theory and engineering aspects of dynamical systems in application areas ranging from small-scale microsystems and mechatronics to large-scale industrial production plants; from physical measurement systems in microscopy and aperture synthesis systems to transportation systems in traffic and aerospace. There is a great number of application areas students can specialize in. The programme attracts numerous students, either with a background in one of the TU Delft BSc programmes or from abroad. The interesting and challenging programme provides top-quality expertise and skills for a successful professional career in research and technology development or any other professional environment.

*Prof. Peter Wieringa*  
Director of Education

*Prof. Paul van den Hof*  
Chairman Education Committee

## Academic calendar 2006/2007

### Fall semester

4/9/06		15.00 Aula: opening academic year
4/09	- 20/10	scheduled teaching activities
23/10	- 3/11	no scheduled activities/ examinations/ scheduled teaching activities
6/11	- 22/12	scheduled teaching activities
27/12	- 5/1/07	Christmas vacation
8/1/07	- 12/1	no scheduled activities
15/1	- 2/2	examinations

### Spring semester

5/2/07	- 23/3	scheduled teaching activities
26/3	- 5/4 (do)	no scheduled activities/ examinations/ scheduled teaching activities
10/4 (Tue)	- 27/4	scheduled teaching activities
6/4		Good Friday
9/4		Easter Monday
30/4	- 4/5	no scheduled activities (May vacation)
7/5	- 8/6	scheduled teaching activities
17/5, 18/5		Ascension day
26/5		no scheduled activities
28/5		Whit Sunday
11/6	- 15/6	no scheduled activities
18/6	- 6/7	examinations
20/8	- 31/8	examinations/repeats

Note: examinations are usually called 'tentamens' in Dutch. Formally an 'examen' in Dutch is the degree audit taking place at the end of a programme phase such as a Propaedeuse (end of first year), a Bachelor or a Master phase. These 'examens' are formalities in the Dutch university system. There are no end-of-year examinations!

## Class hours for Delft University of Technology

### Period Time

1.	08.45	–	09.30
2.	09.45	–	10.30
3.	10.45	–	11.30
4.	11.45	–	12.30
5.	13.45	–	14.30
6.	14.45	–	15.30
7.	15.45	–	16.30
8.	16.45	–	17.30

## TU Delft – University Facts and Mission

Founded in 1862, Delft University of Technology is the oldest, largest, and most comprehensive university of technology in the Netherlands. With over 13.000 students and 2100 scientists (including 200 professors), it is an establishment of both national importance and significant international standing. Renowned for its high standard of education and research, the University collaborates with other educational establishments and research institutes, both in the Netherlands and overseas. It also enjoys partnerships with governments, branch organisations, numerous consultancies, the industry, and companies from the small and medium business sectors. Delft University of Technology has eight faculties offering a host of engineering programmes, many of them unique in the Netherlands.

Working together with other educational establishments, various research institutes, international business partners and the industry, TU Delft aims to provide students with all the necessary tools for a successful career: an excellent education, relevant, practical experience, and the broadest possible knowledge base. Detailed information can be obtained from the website [www.tudelft.nl](http://www.tudelft.nl)

### International Office

This office will be your first point of contact at the University. The International Office staff handles the application procedure, financial and housing matters, and the distribution of student ID cards. The International Office comprises the central TU Delft Student Registration Office, which registers you as a student when you are admitted to TU Delft.

The Student Facility Centre publishes a Guide to Services, which is available from Julianalaan 134 or can be obtained by phoning +31 (0)15 27 88012 or emailing [sfc@tudelft.nl](mailto:sfc@tudelft.nl)

TU Delft International Office  
PO Box 5  
2600 AA Delft

The Netherlands  
Tel: +31 (0) 15 27 88012  
Fax: +31 (0) 15 27 85690  
E-mail: [admission@tudelft.nl](mailto:admission@tudelft.nl)  
Website: [www.studyat.tudelft.nl](http://www.studyat.tudelft.nl)

Visiting address:  
Julianalaan 134  
2628 BL Delft  
The Netherlands

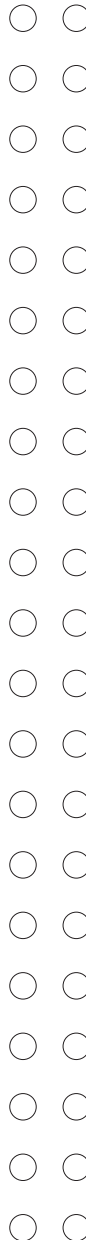
Around October 2006 the International Office and the Student Facility Centre will move to a new location at the Mekelweg.  
Postal address:  
Jaffalaan 9A  
2628 BX Delft  
Visitors' entrance at the Mekelweg

## Service desk

The Service Desk provides you with your transcripts, timetables and exam dates, and it posts the exam results. Here you submit forms, you inform them of recently acquired marks, and a change of address. The Service Desk tracks student progress, i.e. the number of credits and marks you obtain and any group work done in a semester and/or academic year. More information is available on [servicepunt.tudelft.nl](http://servicepunt.tudelft.nl)  
The Service Desk is open Monday to Friday, from 5.00 to 17.00 hours.

## Blackboard

Blackboard provides you with the most recent information about your courses. It is a commercial E-learning medium that serves as a virtual notice board for announcements, timetables, presentation of programme materials, practice materials, exercises and solutions as well as interesting links. You can enter the system using the 'Preview' button in the login



screen, but to access all information, you need a personal login ID.  
Website: [blackboard.tudelft.nl](http://blackboard.tudelft.nl)  
Request assistance through [Blackboard-support@tudelft.nl](mailto:Blackboard-support@tudelft.nl)

## Schedules

For up-to-date schedules, go to [blackboard.tudelft.nl](http://blackboard.tudelft.nl) or the campus website of your faculty.

## TU Delft Library

The TU Delft Library consists of a central branch located behind the Aula and seven faculty branches in a number of locations. The collection, the excellent study facilities, the modern PCs and the package of services in each library are designed to provide you with optimal access to relevant science and technology literature. On the Library's website, [www.library.tudelft.nl](http://www.library.tudelft.nl), you can find all information you need if you want to visit a library or use one of the services of the TU Delft Library.

Customer Services TU Delft Library:  
Tel: +31 (0)15 27 85678  
Fax: +31 (0)15 27 85706  
E-mail: [library@tudelft.nl](mailto:library@tudelft.nl)  
Website: [www.library.tudelft.nl](http://www.library.tudelft.nl)

### Opening times central branch:

	Tuition period	Examination period	Summer holiday
Monday - Thursday	9.00 - 22.00	9.00 - 24.00	9.00 - 17.00
Friday	9.00 - 18.00	9.00 - 22.00	9.00 - 17.00
Saturday - Sunday	10.00 - 18.00	10.00 - 22.00	closed

The opening times of the faculty libraries can be found at [www.library.tudelft.nl](http://www.library.tudelft.nl) under 'locations'.

### Opening times central information desk:

Monday - Thursday	9.00 - 19.00
Friday	9.00 - 17.00
Saturday	10.00 - 13.00
Sunday	closed

Every first Monday of the month: 11.00 - 19.00

## Regulations

There are a number of formal regulations for the faculty organization, the programmes and their execution. These are:

- The Faculty Regulations
- The Course and Examination Regulations ('Onderwijs- en Examen-reglement').
- (Per programme) The Execution Regulations of the Education and Examination Regulations ('Uitvoeringsregeling').
- The Rules and Guidelines of the Board of Examiners ('Regels en Richtlijnen van de Examen Commissie').
- The Student Charter ('Studentenstatuut')

These regulations are published yearly on the web, see the Blackboard community of the programme involved. In case of doubt, your Director of Education or your Study Adviser will be glad to inform and advise you.

### EUROPEAN STUDENT UNION (AEGEE)

AEGEE is the European students' association, represented in 271 cities in 40 countries. Over 17,000 member students are actively involved in travelling, participating in fun and pleasure events and conferences on topics that concern you. There are a lot of possibilities to travel to other places in Europe, meet new people and make friends everywhere! In every city there is an independent local association such as AEGEE-Delft.

Check out the website: [www.aegee-delft.nl](http://www.aegee-delft.nl)



### TU DELFT'S STUDENT UNION (VSSD)

The purpose of the VSSD is to safeguard the interests of all students studying at Delft University of Technology. The Union mainly focuses on areas such as education, income, legal status and housing. The VSSD is a member of the National Student Union (LSVB) and of the ISO (a national student body). As well as representing the collective interest of students, the VSSD also provides support and services to individual students by helping them with financial, housing, study and other problems, and through the publication and sale of reasonably priced textbooks.

#### Office:

Leeghwaterstraat 42 (building 45 on map)

Tel: +31 (0)15 27 82050

Fax: +31 (0)15 27 87585

E-mail: [balie@vssd.nl](mailto:balie@vssd.nl)

Website: [www.vssd.nl](http://www.vssd.nl)

Opening hours: Monday to Thursday 08.30-17.00, Friday 08.30-13.00

#### Shop:

Leeghwaterstraat 42,

Tel: +31 (0)15 27 84125

Fax: +31 (0)15 27 81421

E-mail: [winkel@vssd.nl](mailto:winkel@vssd.nl)

Opening hours: Monday to Friday between 10.30-14.00 and 15.00-17.00

USEFUL WEB ADDRESSES:

www.tudelft.nl (general information about Delft University, history, programmes, research, etc.)

www.studyat.tudelft.nl (information about all BSc and MSc programmes offered by Delft University of Technology, information about the requirements, how to apply, costs, funding, insurance, housing, medical and pastoral care, facilities for special needs students etc.)

www.ideeenlijnOS.tudelft.nl (You can post your suggestions and comments with a view to improving the services provided by O&S on this website. You can also use this address for complaints, of course.)

www.snc.tudelft.nl (TU Delft Sports & Cultural Centre)

www.dsdeflt.nl/centrum (information about Delft)

www.denhaag.org (for activities in the nearby city of Den Haag)

www.uitaandemaas.nl (activities in Rotterdam)

www.amsterdam.nl (activities, news, public transport in and around Amsterdam)

ADDRESSES:

**Delft University of Technology (TU Delft)**

*Visiting address:*

Julianalaan 134  
2628 BL Delft  
The Netherlands

*Postal address:*

PO Box 5  
2600 AA Delft  
The Netherlands



Tel: +31 (0)15 27 89111

Fax: +31 (0)15 27 86522

E-mail (for questions): voorlichting@tudelft.nl

(For information about the city of Delft, please see www.delft.nl)

**Education and Student Affairs**

Tel: +31 (0)15 27 84670

E-mail: OS@tudelft.nl

Website: www.OS.tudelft.nl

- Central Student Administration (CSA)

PO Box 5

2600 AA Delft

Tel: +31 (0)15 27 84249

E-mail: msc2@tudelft.nl

Website: www.csa.tudelft.nl/

Office hours: 8.30-17.00

- International Office

Julianalaan 134

2628 BL Delft

Tel: +31 (0)15 27 88012

E-mail: msc2@tudelft.nl

Website: www.studyat.tudelft.nl

- Student Facility Centre (SFC)

*Study Advisers:*

Opening hours: Monday to Friday 09.00-17.00.

*Student Psychologists:*

Tuesday and Thursday 11.30-12.30

Julianalaan 134

2628 BL Delft

Tel: +31 (0)15 27 88012

E-mail: sfc@tudelft.nl



Around October 2006, Education and Student Affairs (i.e. CSA, International Office, Student Facility Centre) will move to a new location on the Mekelweg.

Postal address:

Jaffalaan 9A

2628 BX Delft

Visitors' entrance at the Mekelweg

### **Sports & Cultural Centre**

Mekelweg 8-10

2628 CD Delft

Tel: +31 (0)15 27 82443

E-mail: sportcentrum@tudelft.nl

Website: www.snc.tudelft.nl

Monday to Friday: 08.30-23.30; Saturday and Sunday: 08.30-19.00.

### **Student Health Care: SGZ**

Surinamestraat 4

2612 EA Delft

To make an appointment, call +31 (0)15 212 1507

Monday to Friday 8.30-12.15

### **Stichting DUWO**

(Delft Housing Agency)

Marlotlaan 5

2614 GV Delft

Tel: +31 (0)15 219 2200

E-mail: info@duwo.nl

Website: www.duwo.nl

Office hours: Monday to Friday 08.30-17.00.

### **Student Restaurants in Delft**

- University main cafeteria, Aula, Mekelweg 5

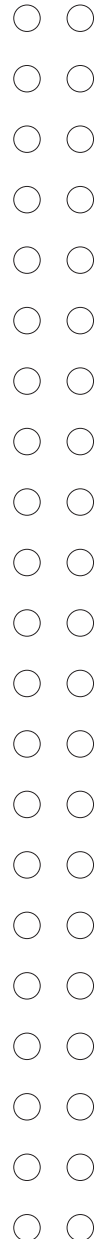
- SnC Café, Mekelweg 8

- Sint Jansbrug, Oude Delft 50-52



- Koornbeurs, Voldersgracht 1
- Alcuin, Oude Delft 123
- CSR, Oude Delft 9
- De Bolk, Buitenwatersloot 1-3
- Novum, Verwersdijk 102-104

# Map of TU Delft



A	Ezelsveldlaan 61	Delft Technology Museum	<input type="radio"/>	<input type="radio"/>
2	Mijnbouwplein 11	Used by various external parties	<input type="radio"/>	<input type="radio"/>
3	Mijnbouwstraat 120	Applied Earth Sciences	<input type="radio"/>	<input type="radio"/>
5	Julianalaan 67	Biotechnology (Kluyver Lab)	<input type="radio"/>	<input type="radio"/>
6	Poortlandplein 6	Botanic Gardens	<input type="radio"/>	<input type="radio"/>
8	Julianalaan 132-134	TU Delft Student Facility Centre	<input type="radio"/>	<input type="radio"/>
9	Zuidplantsoen 2	MultiMedia Services (MMS)	<input type="radio"/>	<input type="radio"/>
10	Zuidplantsoen 6	Student Council	<input type="radio"/>	<input type="radio"/>
11	Zuidplantsoen 8	Real Estate and Facility Management	<input type="radio"/>	<input type="radio"/>
12	Julianalaan 136	Delft ChemTech	<input type="radio"/>	<input type="radio"/>
15	Prins Bernhardlaan 6	Kramers Laboratorium voor Fysische Technologie	<input type="radio"/>	<input type="radio"/>
17	i-WEB:	Vehicle for Research, Education and Design	<input type="radio"/>	<input type="radio"/>
19	Mekelweg 3	Stud: student employment agency	<input type="radio"/>	<input type="radio"/>
20	Mekelweg 5	Aula Congress Centre	<input type="radio"/>	<input type="radio"/>
21	Prometheusplein 1	TU Delft Central Library	<input type="radio"/>	<input type="radio"/>
22	Lorentzweg 1	Faculty of Applied Sciences	<input type="radio"/>	<input type="radio"/>
23	Stevinweg 1	Faculty of Civil Engineering and Geosciences	<input type="radio"/>	<input type="radio"/>
24	Berlageweg 1	Faculty of Architecture, Urbanism and Building Sciences	<input type="radio"/>	<input type="radio"/>
30	Jaffalaan 9	OTB Research Institute	<input type="radio"/>	<input type="radio"/>
31	Jaffalaan 5	Faculty of Technology, Policy and Management	<input type="radio"/>	<input type="radio"/>
32	Landbergstraat 15	Faculty of Industrial Design Engineering	<input type="radio"/>	<input type="radio"/>
33	Landbergstraat 19	Composites Laboratory INHOLLAND/TU Delft	<input type="radio"/>	<input type="radio"/>
34	Mekelweg 2	Faculty of Mechanical, Maritime and Materials Engineering	<input type="radio"/>	<input type="radio"/>
34a	Cornelis Drebbelweg 9	Executive Board	<input type="radio"/>	<input type="radio"/>
35	Cornelis Drebbelweg 5	Examination rooms	<input type="radio"/>	<input type="radio"/>
36	Mekelweg 4 + 6	Faculty of Electrical Engineering, Mathematics and Computer Science	<input type="radio"/>	<input type="radio"/>
37	Mekelweg 8	TU Delft Sports Centre	<input type="radio"/>	<input type="radio"/>
38	Mekelweg 10	TU Delft Cultural Centre	<input type="radio"/>	<input type="radio"/>
40	Rotterdamseweg 137	Materials Engineering	<input type="radio"/>	<input type="radio"/>
43	Leeghwaterstraat 36	Cogeneration plant	<input type="radio"/>	<input type="radio"/>
44	Rotterdamseweg 145	Yes!Delft/Technostarters	<input type="radio"/>	<input type="radio"/>

45	Leeghwaterstraat 42	VSSD & Low Speed Wind Laboratory
46	Leeghwaterstraat 44	Process and Energy Laboratory (API)
50	Mekelweg 15	Radiation Radionuclides & Reactors (R3) / Reactor Institute Delft (RID)
61	Kluyverweg 3	Faculty of Aerospace Engineering: Vliegtuighal
62	Kluyverweg 1	Faculty of Aerospace Engineering
63	Anthony Fokkerweg 1	Faculty of Aerospace Engineering: SIMONA
64	Kluyverweg 2	High Speed Wind Laboratory
65	Kluyverweg 4 + 6	Delft Transport Centre (DTC)

# 1 MSc Systems and Control

## 1.1 GOAL

The MSc programme in Systems and Control covers the analysis and design of reliable and high-performance measurement and control strategies for a wide variety of dynamic technological processes. It centres on fundamental generic aspects of systems and control engineering and stresses the multidisciplinary nature of the field, with applications in mechanical engineering, electrical engineering, applied physics, aerospace engineering and chemical engineering – among them the following.

- High-accuracy positioning and motion-control systems, mechatronics, microsystems, production systems, robotics and smart structures.
- Petrochemical, chemical, physical and biotechnological production processes.
- Transportation systems (automotive, logistical, aerospace).
- Physical imaging systems (acoustic and optical imaging).
- Energy conversion and distribution.
- Biomedical systems.

The programme brings together issues of physical modelling, experiment design, signal analysis and estimation, model-based control design and optimisation, hardware and software in a study of systems of high complexity and of different kinds, such as linear and nonlinear dynamics, hybrid and embedded systems, and ranging from small-scale microsystems to large-scale industrial plants.

The MSc Systems and Control graduate possesses the following knowledge and skills.

1. Knowledge of engineering sciences (electrical engineering, mechanical engineering, applied physics, mathematics) in breadth and in depth, and the ability to apply this to systems and control engineering at an advanced level.
2. Scientific and technical knowledge of systems and control engineering, in breadth and in depth, and the skills to use this effectively. The discipline is mastered at different levels of abstraction, including a reflective



understanding of its structure and its relationships with other fields, and to some extent this knowledge reaches the forefront of scientific or industrial research and development. Moreover, the knowledge possessed can form the basis for innovative contributions to the discipline in the form of new designs or the development of new knowledge.

3. Thorough knowledge of paradigms, methods and tools, as well as the skills to apply that actively in analysis, modelling, simulation, design and the conduct of research pertaining innovative, technologically dynamically systems, with an appreciation of different areas of application.
4. The ability to solve technological problems independently and in a systematic way, by means of problem analysis, formulating subproblems and providing innovative technical solutions, including in new and unfamiliar situations. A professional attitude towards identifying and acquiring new expertise, towards monitoring and critically evaluating existing knowledge, towards planning and carrying out research, towards adapting to changing circumstances and towards integrating new knowledge with an appreciation of its ambiguity, incompleteness and limitations.
5. The ability to work both independently and in multidisciplinary teams, interacting effectively with specialists and taking initiatives where necessary.
6. The ability to communicate effectively about his or her work in the English language, to both professionals and non-specialists, including the ability to make presentations and produce reports on, for example, solutions to problems, conclusions, knowledge and considerations.
7. The ability to evaluate and assess the technological, ethical and social impact of his or her work, and to take responsibility with regard to sustainability, economy and social welfare.
8. The willingness to maintain his or her professional competence independently, through life-long learning.

## 1.2 EDUCATIONAL CONCEPT AND ASSESSMENT

The Master's programme is divided into two main parts.

### Lecture courses (60 EC)

These are divided in three components.

- Compulsory courses (24 EC).
- Elective Systems and Control courses selected from a list provided (at least 19 EC).
- "Free" elective courses chosen by agreement with the MSc thesis supervisor (at least 17 EC). At least 4 EC should be devoted to non-technical courses.

Most courses are assessed by means of an oral or written examination.

### Assignments (60 EC)

The assignments are carried out during the second year of the MSc programme, in most cases on an individual basis.

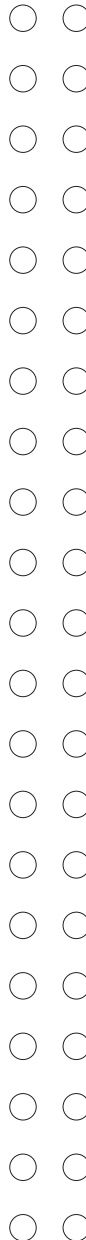
They may include the following.

- An optional traineeship in industry or a project assignment defined in consultation with an external party (industry, research institute, etc.). This is worth 14 EC. If the MSc thesis is prepared in co-operation with and at the premises of an external party, the traineeship component may be combined with the thesis.
- Project work (seminars, project meetings, presentations) (4 EC).
- Preparation of MSc thesis project (literature survey) (14 EC).
- MSc thesis project (42 EC, or 28 EC when combined with an industrial traineeship).

The assignments are assessed on the basis of a written report and, possibly, an oral presentation.

The thesis project is the final assignment in the MSc programme.

The student prepares this thesis as a report of his or her research project. The thesis work is assessed on the basis of an oral presentation by the student and an oral examination before an MSc examining board composed



of at least three members of the academic staff, including the thesis supervisor. The examining board may also include external examiners from research institutes or from industrial partners. See section 1.5 for the assignments requirements.

## 1.3 STUDY PROGRAMME AND GENERAL STRUCTURE

Systems and Control offers an MSc course of two years. Each course year is divided into two semesters and each semester consists of two periods. A period includes seven weeks of lectures, followed by two or three examination weeks.

For those subjects for which written examinations are held, the student will get at least one opportunity per year to do a resit. Resits are generally held in the first period after the regular period for a certain examination. Resits for the examinations held in period 2B are scheduled for the second half of August.

The study load of a course is expressed in European Credits. This is a result of the European Credit Transfer System (ECTS), which encourages acknowledgement of study results between higher education institutions within the European Union. The study load for one educational year is 60 EC. These ECs give an indication of the weight of a certain part of the course. One EC involves approximately 28 hours of study. These 28 hours include all time spent on the course: lectures, self-education, internship, practicals, examinations, etc.

## 1.4 ADMISSION TO THE PROGRAMME

There are several ways to be admitted to the MSc programme Systems and Control. Usually the MSc programme is a continuation of an academic BSc programme. However the Master's programme can also be entered after completing a Bachelor's programme of a Dutch polytechnic institute. Admission to the MSc programme Systems and Control is described in the following two subsections.

### 1.4.1 ACADEMIC BACHELOR'S DEGREE

The prerequisites for admission to the MSc programme for students holding an academic BSc are summarised in the following table:

BSc	Unconditional admission	Conditional admission, subject to completion of an additional programme (max. 30 EC)
Aerospace Engineering	X	
Applied Earth Sciences		X
Applied Physics	X	
Applied Sciences		X
Biomedical Technology		X
Chemical Engineering	X	
Civil Engineering		X
Electrical Engineering	X	
Marine Technology		X
Mechanical Engineering	X	
Technical Informatics		X
Technical Mathematics	X	

#### **BSc Mechanical Engineering, Electrical Engineering, Aerospace Engineering, Applied Physics, Technical Mathematics (TU Delft, TUE, UT and IDEA League)**

Candidates holding a BSc in one of the above subjects awarded by a Dutch University of Technology (Delft, Eindhoven or Twente) or a member institution of the IDEA League (ETH Zürich, Imperial College London or Technische Universität Aachen) may enter the MSc programme unconditionally.

A student who has yet to complete the BSc may be permitted by the Board of Examiners to take examinations from the MSc programme. The prerequisites for such conditional admission are that the student has passed the first year of the BSc and has already obtained at least 100 EC in the second and third-year programme. Final admission is granted after completing the BSc.

#### **BSc Chemical Engineering (TU Delft, TUE, UT and IDEA League)**

A candidate holding this degree may enter the programme subject to completion of the following elective courses from the MSc programme.

Chemical Engineering

- wb2207 Control Engineering 3 EC
- wb2310 Systems and Control Engineering 3 4 EC

Students can be conditionally admitted to the MSc programme if they have passed the propaedeutic examination and earned at least 100 EC of the second and third year of the Bachelor's programme. Final admittance is granted after completing the additional courses.

#### **Other TU Delft BSc degree**

The contents of the BSc degree and marks of each candidate will be evaluated by the intake coordinator of the board of examiners. The selection procedure can result in:

- Admission without additional requirements.
- Admission with additional requirements of less than 15 EC. In this case the total study programme will involve 120 EC.
- Admission with additional requirements between 15 and 45 EC. In this case 15 EC are part of the 120 EC of the regular MSc programme and at most an additional 30 ECs is required besides the regular MSc programme. The total study programme will involve 120 + max 30 = at most 150 EC.
- No admission. The candidate has to obtain the Marine Technology BSc degree first. Within the BSc programme exemption for some courses is possible, depending on earlier education.

With approval of the Board of Examiners the student can be conditionally admitted to the MSc programme, to take part in interim examinations of a few MSc courses. Requirements for conditional admission are: the student has passed the propaedeutic examination and has obtained at least 100 ECs of the second and third year, including the BSc thesis. Final admittance is granted after completion of the BSc programme.

#### 1.4.2 BACHELOR'S DEGREE FROM DUTCH INSTITUTE OF HIGHER EDUCATION (TH)

Candidates holding a BSc degree from a Dutch institute of higher education (HBO) programme in Electrical Engineering, Mechanical Engineering, Applied Mathematics, Applied Physics or Aerospace Engineering may be admitted to the MSc subject to selection by the Board of Examiners (intake co-ordinator) and completion of a pre-Master's programme (conversion course). The TH Bachelor's programme must have been completed within the past four years, with good results. Pre-Master's programme and MSc courses may be taken simultaneously. Final admission to the MSc is granted after completing the pre-Master's programme.

The courses on the pre-Master's programme are taught in Dutch. The structure of the programme is as follows.

Course code	Course name	Contact hours	EC
wi2256th	Linear Algebra for TH Students	2/2/4/0	6
wi1152th	Analysis for TH Students, Part 1	4/0/0/0	3
wi1153th	Analysis for TH Students Part 2	0/4/0/0	3
wi1154th	Analysis for TH Students Part 3	0/0/4/0	3
sc3010tn	Stochastische Signaalanalyse	0/0/4/4	4
tn2545	Systems and Signals	4/4/0/0	6
wb2207	Regeltechniek	4/0/0/0	3

By agreement with the MSc Co-ordinator, other courses may be selected according to the student's individual profile and the course schedule. Any such proposed personal conversion programme has to be approved by the Board of Examiners.

#### 1.4.3 BACHELOR DEGREE OF ROYAL NETHERLANDS NAVAL COLLEGE (RNNC)

RNNC 'KIM – Technische Dienst' or 'KIM – Elektrotechnische Dienst' candidates, who have completed the fourth course year, including the practical operational introduction.

A selection of candidates will be made. The intake coordinator of the Board of Examiners is responsible for this selection. Depending on earlier (RNNC) education an individual study plan is drawn up. This plan has to be approved by the Board of Examiners.

This plan (100 EC) should comply with the following requirements:

- compulsory courses (24 EC)
- elective Systems and Control courses (19 EC)
- elective technical courses (11 EC)
- project work (4 EC)
- preparation MSc thesis project/literature survey (14 EC)
- MSc thesis project (28 EC)

#### 1.5 MSC SYSTEMS AND CONTROL

##### 1.5.1 DELFT CENTRE FOR SYSTEMS AND CONTROL (DCSC)

The MSc programme in Systems and Control began in September 2003. It is taught by the Delft Centre for Systems and Control (DCSC) within the Faculty of Mechanical Engineering and Marine Technology. DCSC is a merger of the three former systems and control groups in the faculties of Mechanical Engineering and Marine Technology (OCP), Information Technology and Systems (ITS) and Applied Sciences (TNW). For more information, visit [www.dcsc.tudelft.nl](http://www.dcsc.tudelft.nl).

The DCSC team consists of three full-time professors, two Van Leeuwenhoek professors and one part-time professor. Every MSc student has one of these professors as their formal thesis supervisor.

- Prof. O. H. Bosgra  
Modelling, identification, control and model-based optimisation; applications in mechanical servo systems and industrial production processes.
- Prof. P. M. J. van den Hof  
Model-based measurement and control, system identification, signal processing and data-based control; applications in physical imaging systems, microsystems and industrial production processes.
- Prof. M. H. G. Verhaegen  
Identification, model-based and fault-tolerant control; non-linear, hybrid and embedded systems; applications in transportation, automotive, robotics and microsystems, power systems and switching networks.
- Prof. R. Babuska  
Intelligent modelling, control and decision-making for non-linear dynamic systems; fuzzy control and neural networks; applications in industrial processes, biotechnology and aerospace systems.
- Prof. C. Scherer  
Fundamental aspects of systems and control theory, robust and multi-objective optimisation, modelling and control of uncertain linear and non-linear systems with applications to mechanical servo and microsystems.
- Prof. J. Hellendoorn  
Hierarchical and predictive/anticipative control and decision making, computational intelligence (fuzzy logic, neural networks), traffic applications, condition monitoring.

In consultation with the MSc student adviser, the student chooses a thesis from a list of available projects posted on the internet. Also listed is the name of the day-to-day supervisor who will coach the student throughout the project.

Most MSc theses fall within the scope of an ongoing research project at the Delft Centre for Systems and Control. Alternatively, projects may also be chosen in co-operation with one of the following research groups affiliated to the MSc programme.



### 1.5.2 AFFILIATED RESEARCH GROUPS

The following research groups are affiliated with the MSc programme in Systems and Control. In joint projects with DCSC, students can participate in ongoing research projects within and/or in co-operation with these groups.

- 3mE/AM – **Advanced Mechatronics**  
Design, instrumentation and control of mechatronic systems, with applications in high-precision motion control systems as used in, for example, IC production machines and selected microsystem applications.  
Website: [www.3me.tudelft.nl/am](http://www.3me.tudelft.nl/am)
- 3mE/MMS – **Man-Machine Systems**  
Interactions between humans and the technical systems they control, with applications in supervisory control of industrial and other processes, the ergonomic design of technical systems, robotics and biomedical engineering. Website: [www.mms.tudelft.nl](http://www.mms.tudelft.nl)
- EWI/CROSS – **Mathematical System Theory**  
Basic systems and control theory, including dynamic game theory, digital control, robust control, systems subject to constraints and discrete event and switching systems with applications in, for example, traffic control systems.
- LR/CS – **Control and Simulation**  
Modelling, identification, simulation and control of aircraft and spacecraft systems, including flight testing and air-traffic management.  
Website: [www.cs.lr.tudelft.nl](http://www.cs.lr.tudelft.nl)
- TNW/DCT – **Process Systems Engineering**  
Integrated design, control and optimisation of sustainable chemical processes. Website: [www.dct.tudelft.nl/ps](http://www.dct.tudelft.nl/ps)
- TNW/BT – **Bioprocess Technology**  
Modelling, measurement and design of bioprocesses; dynamic optimisation of fermentation processes and environmental biotechnological processes; systems biology, metabolic engineering.  
Website: [www.bt.tudelft.nl/bpkf.htm](http://www.bt.tudelft.nl/bpkf.htm)
- CiTG/TPE – **Dynamic Traffic Management**  
Modelling, simulation, monitoring, control and dynamic management of road, railway and pedestrian traffic. Website: [www.transport.citg.tudelft.nl](http://www.transport.citg.tudelft.nl)



As a third option, MSc thesis projects can be performed outside the university as part of one of the ongoing co-operative research projects between DCSC and its industry and institutional partners.

### Relationship with the national graduate school, DISC

The MSc is an excellent way of preparing for the PhD programme offered by the national graduate school, DISC (Dutch Institute of Systems and Control). This is housed in the same research centre at Delft University of Technology.

### 1.5.3 CURRICULUM

The compulsory component of the curriculum, as shown in the table below, consists of three basic courses in key areas of systems and control: modelling and dynamic systems analysis, signal analysis and filtering, and control theory. There are also two compulsory project components. The first is an introductory project in which basic knowledge and skills in systems and control, including the required background in mathematics and engineering subjects, are refreshed and brought to the same level for all incoming students. The second is an integration project performed in the laboratory, in which the knowledge acquired during the compulsory courses is applied to real-world situations.

### First year

#### Compulsory Systems & Control courses

Course code	Course name	Contact hours	EC
sc4010	SC Introductory Project	x/0/0/0	3
sc4020	Control Theory	4/0/0/0	6
sc4031	Modelling & Systems Analysis	0/3/0/0	4
sc4040	Filtering & Identification	0/4/0/0	6
sc4050	SC Integration Project	0/0/0/4	5
<b>Total</b>			<b>24</b>

#### Elective Systems & Control courses (19 EC to be selected)

Course code	Course name	Contact hours	EC
sc4060	Model Predictive Control	0/0/3/0	4
sc4080	Knowledge-Based Control Systems	0/0/3/0	3
sc4090	Optimisation in Systems and Control	4/0/0/0	3
sc4110	System Identification	0/0/4/4	5
sc4120	Special Topics in Signals, Systems and Control	0/0/0/2	3
sc4130	Modern Robotics	0/0/4/0	4
sc4150	Fuzzy Logic and Engineering Applications	3/0/0/0	3
sc4160	Modelling and Control of Hybrid Systems	0/0/4/0	3
wb2303	Measurement Theory and Practice	0/0/2/2	3
wb2305	Digital Control	0/4/0/0	3
wb2414	Mechatronic Design	2/2/0/0	3
wb2415	Robust Control	0/0/4/0	6
wb2416	Linear Matrix Inequalities in Control	0/0/0/4	6
wb2421	Multivariable Control Systems	0/4/0/0	6
wb2426	Chemistry and Chemical Plant	0/0/2/2	3
wb2427	Predictive modelling	0/0/4/0	3
wb4432-05	Process Dynamics and Control	0/0/0/4	3
ae3302	Flight Dynamics 1	2/2/0/0	4,5
ae4301	Automatic Flight Control System Design	0/4/0/0	3
ae4305	Spacecraft Dynamics and Control	0/4/0/0	3
ae4361	Flight Simulation	0/0/0/4	3
ce3511	Modelling and Computational Methods in Process Technology	0/0/2/2	4
ct4801	Transportation and Spatial Modelling	10/0/0/0	6
ct4821	Traffic Flow Theory and Simulation	0/0/8/0	4,5
ct4822	Dynamic Traffic Management: Traffic Control	0/8/0/0	4,5
ct5804	ITS Dynamic Road Management	4/0/0/0	3

et4245wb	Electromechanical Systems	0/0/0/3	4,5
lm3511	Systems Biology	0/0/3/3	6
wi4039	System Theory	0/0/3/0	6
wi4040	Optimal Control	0/0/4/0	6

For a list of courses offered by the Dutch graduate school for Systems and Control (courses taught on Mondays in Utrecht), see the current DISC programme available at [www.disc.tudelft.nl](http://www.disc.tudelft.nl)

### Other elective courses

A further 13 EC should be taken from other technical courses. These must be approved by the MSc co-ordinator.

Up to 10 EC in this category may be chosen from the list of elective Systems & Control courses. Four EC should be devoted to non-technical courses.

### Profiles

To facilitate the choice of elective DCSC courses, the following list provides an indication of how they could be selected to produce four specific profiles.

- Systems and Control Theory.
- Mechatronic Systems.
- Process Control and Optimisation.
- Information Technology and Control.

A	B	C	D	Code	Course
•		•	•	SC4060	Model Predictive Control
		•	•	SC4080	Knowledge-Based Control Systems
•		•	•	SC4090	Optimisation in Systems and Control
•	•	•		SC4110	System Identification
•				SC4120	Special Topics in Signals, Systems and Control
	•			SC4130	Modern Robotics

•			•	SC4150	Fuzzy Logic for Engineering Applications
•			•	SC4160	Modelling and Control of Hybrid Systems
	•			WB2303	Measurement Theory and Practice
	•	•	•	WB2305	Digital Control
	•			WB2414	Mechatronic Design
•	•			WB2415	Robust Control
•				WB2416	Linear Matrix Inequalities in Control
•	•	•	•	WB2421	Multivariable Control
		•		WB2426	Chemistry and Chemical Plant
	•			WB3404A	Vehicle Dynamics A
		•		WB4432-05	Process Dynamics and Control

Courses in profile A place a particular emphasis on the fundamentals in systems and control, with an explicit orientation towards research. Courses in B and C are suited to the development of expertise concerning control systems in two conceptually different application domains, and courses in profile D focus on the relationship between control and information technology. This distribution is only meant to provide an idea of how an individual course programme is compiled, and in no way imposes any formal restrictions.

### First year

Courses	EC
Compulsory	24
Systems & Control electives	19
Other technical electives*	13
Non-technical electives	4
<b>Total</b>	<b>60</b>

\* Max. 10 EC from the list of Systems & Control elective courses.

## Second year

Component	EC	EC
Project work (seminars, project meetings, presentations)	4	4
Preparation of MSc thesis project (literature survey)	14	14
MSc thesis project	42	28
Traineeship (optional )	0	14
<b>Total</b>	<b>60</b>	<b>60</b>

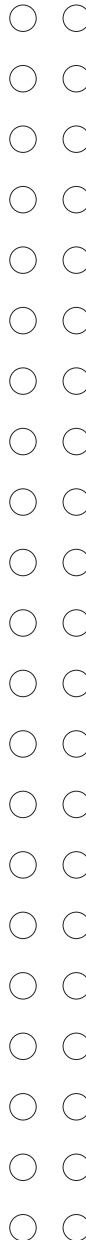
When a traineeship is taken, the value of the MSc thesis project is reduced to 28 EC. When joining the MSc programme, the student should compile a list of proposed courses and submit this to the MSc co-ordinator for approval. The required form can be obtained from the MSc co-ordinator or downloaded from the website.

### 1.5.4 ANNOTATION SUSTAINABLE DEVELOPMENT

The annotation Sustainable Development can be completed as an addition to the specialization programme. After completing the annotation, the student receives a supplement to the MSc degree, which declares a more than average knowledge about that subject. The study programme, including the annotation, has to comply with the requirements of section 1.2 (120 EC).

Sustainable development is becoming of increasing importance. Nowadays technology plays an important role in approaches to sustainability-related problems. For this reason TU Delft offers students the possibility to specialise in SD. The curriculum is based on elective modules, a colloquium and the MSc thesis. The aim of the colloquium is to develop broad knowledge of all kinds of environmental and technical issues and to place this in perspective. Every faculty has a SD lecturer with specific expertise to assess the thesis. The broad knowledge is guaranteed through the colloquium 'Technology in Sustainable Development' (wm0922tu, 4 EC) and a number of elective courses in the field of SD (at least 11 EC).

Further information about the available courses can be obtained from [www.odo.tudelft.nl](http://www.odo.tudelft.nl) and dr.ir. Ton van den Boom, MSc Co-ordinator.  
Location: 8C, 3rd floor, room 09



Tel: +31 (0)15 27 84052

E-mail: [t.j.j.vandenboom@dsc.tudelft.nl](mailto:t.j.j.vandenboom@dsc.tudelft.nl).

For enquiries concerning the colloquium and enrolling: Gertjan de Werk, [g.dewerk@tbm.tudelft.nl](mailto:g.dewerk@tbm.tudelft.nl).

### 1.5.5 TECHNICAL UNIVERSITY TEACHER COURSE (TULO)

Graduated Masters of Science Systems and Control, Mechanical Engineering or Maritime Technology have the opportunity of participating in a special course to become a high school teacher in science or mathematics.

There is a standard course, which includes 60 EC. A maximum of 30 of these ECs can be integrated in the MSc study programme, the other, at least, 30 EC have to be earned in a post-MSc course.

For more information on admission to the programme and the study programme, please contact the office of TULO.

Office of TULO

Faculty TBM

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### 1.6 ENROLLING FOR MODULES AND TESTS

Usually it is necessary to enrol for modules and tests.

#### Modules

Students can enrol for specific modules through Blackboard. Most of the communication between lecturer and students runs via Blackboard announcements. Exchange of information, assignments and reports often takes place via Blackboard also.

#### Tests

Enrolling for tests is compulsory and can be done at the TAS site (Tentamen Aanmeld Systeem [www.tas.tudelft.nl](http://www.tas.tudelft.nl)). This should be done two weeks before the test takes place at the latest, otherwise the test will not be

accounted for by the lecturer. If a student has enrolled, but decided not to do the test, the student must cancel this at least one week before the test takes place.

### 1.7 PASS RULES AND CRITERIA FOR 'CUM LAUDE'

#### Pass rules

To pass a course or assignment, a grade of at least 6 is necessary. It is possible to pass the MSc examination with one grade of 5. The grades are rounded off to the nearest integer.

#### Re-sits

For those subjects subject to written examinations, the student will have at least one opportunity per year to do a re-sit. Re-sits generally take place in the first period after the regular period for a certain examination. Re-sits for the tests given in period 2B are scheduled in the second half of August.

#### Examination

On completing the programme, the student should apply for the Master's examination by means of a form, available from the Education Support Staff.

#### 'Cum laude'

At the discretion of the Board of Examiners, a candidate for the Master's degree can receive the designation "cum laude" if he or she meets the following conditions:

- the mark awarded to the components specified in the Master's examination implementation procedures shall average no less than 8, excluding the Master's Thesis in a list that contains no marks below 6;
- the candidate concerned shall have completed the Master's degree programme in no more than three years;
- the mark awarded for the thesis project shall be no less than 9;
- the examiner of the graduation assignment shall have submitted a proposal for the award of "cum laude".

This is part of the "Regulations and guidelines for the Board of Examiners", appendix 6.1 of this study guide.



### 1.8 HONOURS TRACK

For excellent students it is possible to follow an honours track for their programme. An honours track is a special individual programme, in addition to the regular Master's programme, of 30 EC (840 hours) and is related to Materials Science and Engineering and / or to the role of technology within society. The extra programme has to be completed during the Master's programme of the student. Students who have successfully completed their honours track receive a special certificate from the university. Students who have finished the Bachelor's programme with a weighted averaged mark of 7.5 or higher and students who have shown an excellent performance during the first semester (no fails and weighted averaged mark 7.5 or higher), are eligible for following the honours track in their Master's programme. The Director of Education is responsible for the programme of each individual honours track.

### 1.9 STUDY AND INTERNSHIP ABROAD

Study abroad offers a lot of attractive prospects. You become acquainted with a different (organisational) culture, a different university life and a different educational system. Besides you expand your personal network, you learn to live within a foreign environment, and you improve your knowledge of languages. To put it briefly: a period of study abroad will make a valuable contribution to your personal education and you will draw much benefit from it during your search for a permanent job.

You can make use of one of many exchange agreements with European and non-European universities for your study at a foreign university. Within such an agreement you do not pay the foreign university any tuition fee. In addition to this, grants are available for financing the additional expenses for staying abroad. For initial information on studying abroad you are advised to visit the Back Office International Programmes of the Student Facility Centre. Much documentation about study abroad is available from this Centre, like information on all universities with which exchange agreements exist, possibilities of financing, and travel reports from students. Information is also available on the website: [www.sfc.tudelft.nl](http://www.sfc.tudelft.nl).

If you have a clear idea about where you want to go to, you can ask the Coordinator for International Exchange for advice about your programme at the foreign university and about the recognition of your results at the host university. Your graduation professor will judge your work afterwards according to the rules you agreed upon, prior to departure. The foreign programme should at least contribute 12 EC to the Master's programme. To arrange everything you have to do a lot yourself. Therefore you have to take a preparation period into account of preferably a year, but at least half a year.

### Internship

Usually an internship is arranged via one of the staff members of the department. In addition to this you can visit the Information Centre of the Student Facility Centre (see above). They offer a lot of information, not only on a large number of companies abroad, but also on finance-related affairs, working permits, visa, etc. Additional information is available from the website: [www.sfc.tudelft.nl](http://www.sfc.tudelft.nl).

International Coordinator 3mE

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### 1.10 PROFILE OF THE SYSTEMS AND CONTROL GRADUATE

MSc Systems and Control graduates find their jobs in nearly all branches of industry, in management, design, research, development or technical departments. An increasing number of them are advising on or selling high-grade products and capital-intensive equipment. In our technologically advanced society, government agencies constantly need people with high-level technical qualifications – for example, to help in policymaking. There is a place for Systems and Control experts in scientific education.

The combination of the broad-based BSc programme and the wide choice of specialisations available at MSc level makes Delft Systems and Control graduates highly employable in a variety of professions. These include designer, scientific researcher, organisational expert and IT consultant. Many advance quickly to management positions within a short period: within about a year of graduation, between 25 and 30 per cent are leading teams averaging five or six people.

## 2. Faculty

The faculty 3mE offers the study programmes Biomedical Engineering (BME), Materials Science and Engineering (MSE), Mechanical Engineering (ME), Marine Technology (MT), Systems and Control (SC) and Offshore Engineering (OE). The faculty also participates in the interfaculty MSc programmes Transport, Infrastructure and Logistics (TIL).

3mE is an abbreviation of Mechanical, Maritime and Materials Engineering. The organisation of the faculty and the structure of the educational and Board of Examiners of the faculty are described in the faculty regulations. The dean has the final responsibility for the faculty. He is assisted by the Director of Education. Together with the department heads they form the management team. The dean is supported by the Faculty staff and is advised by a number of advisory boards.

### Dean

Prof. M. Waas  
Room: 8F-1-14  
Tel: +31 (0)15 27 85401  
E-mail: m.waas@tudelft.nl

### 2.1 DELFT CENTRE FOR SYSTEMS AND CONTROL

MSc Systems and Control is provided by the Delft Centre for Systems and Control. This is part of the Department of Mechatronics and Control in the Faculty of Mechanical Engineering and Marine Technology. The Centre combines research and teaching in systems and control theory and engineering, encompassing both fundamental research on theoretical issues and high-tech applications. As well as this MSc, the Centre contributes to other TU Delft Bachelor's and Master's programmes – amongst the Mechanical Engineering, Electrical Engineering, Applied Physics and Chemical Engineering.

The Centre employs five full-time professors and one part-time, 13 other academics, 15 technical support staff and 30 PhD students. It is housed on the ground, second and third floors of building 8C (to the left of the main entrance), and on second floor of building 5. Its laboratory is on the ground floor of building 5.



### Management

Prof. Paul M. J. Van den Hof  
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E-mail: p.m.j.vandenhof@dcsc.tudelft.nl

Prof. Michel H. G. Verhaegen  
Room 8C-2-25  
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Prof. Okko H. Bosgra  
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E-mail: o.h.Bosgra@dcsc.tudelft.nl

### Secretary

Ms Ellen van den Berg-Moor  
Room 8C-2-7  
Tel: +31 (0)15 27 82473  
E-mail: info@dcsc.tudelft.nl

### 2.2 EDUCATION AND STUDENT AFFAIRS

The education and student affairs staff is responsible for providing support to Mechanical Engineering students. Students can obtain information on all issues related to the Mechanical Engineering programmes. The department consists of the following staff:

Dr. Eric Logtenberg  
Manager Department O&S  
Tel: +31 (0)15 27 89520  
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Assistant Coordinator Education  
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Fatma Çinar  
Assistant International Coordinator  
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Teuni Eden  
Study Adviser  
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Ewoud van Luik  
Coordinator Education  
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Education and Student Affairs  
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Tel: +31 (0)15 27 85499  
Fax: +31 (0)15 27 88340

### 2.3 EDUCATION COMMITTEE

The education committee advises the dean and the director of education on the contents and the structure of the study programme and the examinations. The education committee exists of four lecturers and four students. In addition the director of education, the education adviser and a study adviser take part in the meetings.

#### **Chairman**

prof.dr.ir. Paul M.J. Van den Hof  
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### Secretary

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2628 CD Delft  
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E-mail: n.vandenberg@dcsc.tudelft

### 2.4 BOARD OF EXAMINERS

The Board of Examiners consists of all lecturers involved in the study programme, as mentioned in paragraph 1.5.  
The Board of Examiners is responsible for the rules and regulations of the examinations and the assessment of the examination results. Requests for a deviation to the standard programme can be submitted to the Board of Examiners.

### Chairman

prof.dr. Carsten W. Scherer  
Mekelweg 2,  
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### Secretary

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### 2.5 STUDENT SOCIETY

The society for Systems and Control at TU Delft is called VerstelRegel. Its aims are to bring students and staff closer together, to help future MSc students establish contact with the group and to organise lunches, excursions to companies and research institutes and sporting events. VerstelRegel is



run by a board which currently consists of four MSc students. They can be contacted by e-mail, at [verstel@controllab.et.tudelft.nl](mailto:verstel@controllab.et.tudelft.nl), through the website [verstelregel.gigaglas.nl](http://verstelregel.gigaglas.nl) and through the group secretariat.

### 2.6 STUDENT GUIDANCE

#### 2.6.1 MSC COORDINATOR

The MSc coordinator is the person for questions or problems related to the individual study programme and for monitoring progress.  
Every student should consult the MSc coordinator before the end of the first semester to set up an individual study programme using the following ingredients: compulsory courses, current ideas about the theme of the thesis project, the Specialisation Courses that bridge the gap between the compulsory courses and the thesis project and the use of the free elective space. The student submits his/her plan for approval to the Board of Examiners.  
In order to finish the programme in two years, the student should plan to take an average of 30 credits worth of courses per semester. At the end of the first year, the student and the MSc coordinator will discuss his/her progress and planning.

The MSc coordinator is dr.ir. Ton van den Boom  
Mekelweg 2  
Location: 8C, 3rd floor, room 09  
Tel: +31 (0)15 27 84052  
E-mail: [t.j.j.vandenboom@dcsc.tudelft.nl](mailto:t.j.j.vandenboom@dcsc.tudelft.nl)

#### 2.6.2 STUDY ADVISER

For assistance and advice to students the faculty has two study advisers. The study adviser is the person to see about questions or problems related to your studies or issues which may influence your ability to study. The study adviser also acts as a confidential contact to students.

#### Individual help and advice

The study advisers have no teaching responsibilities and can, therefore, devote themselves to helping individual students solve problems which



may be an obstacle to their academic progress. They are also involved in several committees and are in contact with the lecturers, so they are always up-to-date with the latest developments in the Mechanical Engineering programme. They are in contact with the study advisers at the other TU Delft faculties and with those outside the University; they know what is going on in their field.

### Personal circumstances

Personal information will often be discussed during a talk with a study adviser. You can be sure that this information will be dealt with confidentially. This kind of information will only be used with your permission for requests to make an exception to TU Delft or faculty regulations.

### Advice to the Board of Examiners, a professor, ...

Under certain conditions a study adviser can decide to advise for example the Board of Examiners to change a decision in favour of a specific student. If necessary the study adviser will act as intermediary between student, dean, psychologists and family doctors. The degree to which the study adviser helps a student is up to the student. The study adviser keeps an eye on the academic progress of all students and may contact them if necessary, but you are strongly recommended to contact the study adviser yourself when facing a question or problem. Waiting often only makes the problem worse. You can contact the two study advisers of the faculty with any questions. They also have their own specialisms.

### Foreign Student Financial Support (FSFS)

The Delft University of Technology provides financial assistance to foreign students in cases where they face a study delay due to special circumstances like an illness, a physical or sensory disorder, mental problems, and insufficient organisation of the educational programme by the faculty.

Mrs Teunie Eden, study adviser for all 3me BSc and MSc students, as well as harassment counsellor (see below)

Specialisms: Exchange students, International MSc students, social programme international students.



Mekelweg 2,  
Room 8C, ground floor  
E-mail: t.eden@tudelft.nl  
Tel: +31 (0)15 27 82176

Jaap v.d. Zanden, study adviser for all 3me BSc and MSc students  
Specialisms: Graduate students, polytechnic high school students, quality control, student mentors.

Mekelweg 2, 8C, ground floor  
E-mail: j.vanderzanden@tudelft.nl  
Tel: +31 (0)15 27 82996

### Dyslexia

Students suffering from dyslexia usually have problems reading and understanding long texts. This may hamper 'normal' academic progress. These students are therefore advised to contact one of the study advisers and to set up a remedial plan. Important issues are:

- A planned study delay often helps
- If necessary, extra time for examinations can be requested
- Studying with a fellow student often improves academic progress
- IBG offers extra student grants

### 2.7 WORKING CONDITIONS, RSI AND HARASSMENT

RSI (Repetitive Strain Injury) is a well-known problem. Within TU Delft, the number of complaints caused by RSI is increasing. Too many employees and students still neglect the first symptoms of RSI, not knowing where to find answers to their questions. A lot of information on this issue is available on the Internet. An example is [www.rsi.pagina.nl](http://www.rsi.pagina.nl). Free software can be downloaded from the 3me website, which can help you prevent RSI: go to [www.3me.tudelft.nl](http://www.3me.tudelft.nl) > facilities.

### Causes

There are two mechanisms that cause RSI:

- Repetitive tensing of muscles in fingers and hands, without taking breaks, can cause an overload in these muscles. Friction between muscles,

tendons and bones can eventually cause damage.

- Constant tension of muscles in the neck, shoulders and arms restricts blood circulation and damages nerves. This results in cold and tingling fingers. Mental stress and poor posture increase this effect.

### Symptoms

There are various symptoms that indicate RSI: pain, stiffness, tingling and a loss of strength can occur in the neck shoulders, arms, wrists, hands and sometimes even in the legs. Without rest, these symptoms will only get worse.

### Prevention

How to prevent RSI:

- Intersperse repetitive movements, like typing and using a mouse, with non-repetitive ones, like walking to the printer or reading documents.
- Take regular breaks. You are advised to take a 10-minute break after every two hours of work and a 20-second break after every 10 minutes of work in order to improve blood circulation. It is even better to do exercises during these breaks. Anti-RSI software can help in this respect.
- It is strongly discouraged to do more than six hours of computer work a day.
- Make sure that you maintain a good working posture. Arrange the workstation to suit you. Sit straight in front of your monitor and keyboard. The height and distance of the monitor and desk should be sufficient. A chair with a convex back at waist height is favourable.
- Try not to work under stress caused by deadlines or private problems.

Do not ignore the symptoms of RSI. If you have any questions, please contact the following people:

- Study Adviser
- Health & Safety Adviser: Leen Paauw, e-mail l.paauw@tudelft.nl
- Student Health Care (SGZ), tel: +31 (0)15 21 21507, e-mail studentenartsen@sgz.nl
- Student Facility Centre (SFC), e-mail www.sfc.tudelft.nl
- VSSD support, tel: +31 (0)15 27 82057, e-mail www.vssd.nl



### Harassment

Harassment is inappropriate, unwanted behaviour that is offensive, frightening, or in any way distressing. Teasing, mocking, gossiping, bullying, sexual or racial intimidation, violence and discrimination are all forms of harassment.

### Harassment Counsellor

If you have problems you can turn to the Harassment Counsellor appointed by the Faculty. These counsellors operate on a strictly confidential basis and can offer advice, information, support and assistance to victims of harassment. When necessary they may enlist the assistance of mediators. They can also assist and guide you should you wish to submit your complaint to the TU Delft Complaints Committee. All actions are subject to your permission and approval. If you experience any problems in this area, do not hesitate! Everyone at TU Delft has the right to feel safe and respected! The Harassment Counsellor of our Faculty is:

Mrs T. Eden  
Mekelweg 2  
Room 8C, ground floor  
Tel: +31 (0)15 27 82176  
E-mail: t.eden@tudelft.nl

### 2.8 QUALITY CONTROL

The quality of the education is continuously monitored and evaluated. This is done by the faculty itself and by external organisations. The results of the evaluations are public. A summary of these results can be found on the Internet. Based on these results, the Education Committee and the Director of Education advise the dean.

Internal Quality Control:

- In order to evaluate the opinion of the students, a **course evaluation system** is in place. This system gives all students the opportunity of giving their opinion on the education programme. The study programme and courses are evaluated each year by means of a questionnaire.

- **Evaluation meetings** with students and lecturers.
- Submitting and dealing with **complaints**. These complaints can be lodged with the student society or the Director of Education.
- The faculty regularly evaluates its education programme and research in self-assessments.

External quality control:

- The programmes are accredited every five years by the NVAO (Nederlands Vlaamse Accreditatie Organisatie). In preparation of the accreditation, the programme is evaluated by a visitation committee formed by QANU (Quality assurance Netherlands Universities)

## 2.9 INFORMATION SERVICES

### Study guide

This study guide is the main source of information on the degree programme and is available to all students from the Service Desk of the Faculty.

The most recent information however is always available on the faculty website. Announcements which are of importance for the study, like changes to the schedules, are posted well in advance on the Faculty homepage and on Blackboard. Schedules of lectures, assignments and examinations are available on the campus site. Any changes to these schedules are given on Blackboard. Grades can also be found on Blackboard.

Information not directly related to the programme, like information from the student society 'Leeghwater', will be published on notice boards.

Members of 'Leeghwater' are also kept informed by e-mail.

## 2.10 FACULTY REGULATIONS

- It is not allowed to smoke within the faculty building.
- Students have to follow the instructions of academic and support staff.
- Upon request of a staff member, students shall identify themselves by showing the campus card.
- Students shall be on time, before the lecture, assignment, instruction or meeting starts. The lecturer or student assistant may refuse admission to students who are late.



- Regular times for lectures to start are:

Lecture	Start	End
1st hour:	8.45	9.30
2nd hour:	9.45	10.30
3rd hour:	10.45	11.30
4th hour:	11.45	12.30
5th hour:	13.45	14.30
6th hour:	14.45	15.30
7th hour:	15.45	16.30
8th hour:	16.45	17.30

- All bicycles are to be parked in the racks provided.
- Personal belongings can be stored in lockers located in the main hall. In the corridor alongside lecture rooms A – F bigger lockers are available, suitable for storing helmets. All lockers must be emptied at the end of the academic year, before 15 July and the keys should be returned. Lockers still in use after 15 July will be emptied and provided with a new lock at the student's expense.
- Eating and drinking is only allowed in the canteen, the coffee corner and in the immediate surroundings of a drinks or candy machine.
- Writing or drawing on, or intentionally etching into furniture, walls, doors or windows is prohibited.
- General waste and paper should be disposed of in bins.
- The Rules for Use of Computers, Network Connections, Printers and Plotters should be obeyed.
- Violation of rules and regulations can result in suspension or termination of facilities or services. Theft or intentional damage to Tu Delft property and serious misconduct will be brought to the attention of the proper authorities.

### Internet facilities

The utilisation of Internet facilities at the faculty is subject to some regulations:

It is allowed to:

- Send e-mails to persons (or applications) from whom it can be expected that they will not consider the e-mail as annoying. Also, you can receive

- e-mails which can be stored temporarily in the inbox.
- Read online magazines and to place articles in it.
- Use network information services like WWW servers and FTP servers which are currently in use and those that will become available in the future. All use of services is subject to regulations.
- Use the “Intranet DUNet” on telephones provided throughout the faculty.

It is not allowed to:

- Damage or disable facilities.
- Use available facilities in any other way than their intended use: downloading, uploading and file sharing of copyright-protected items, such as texts, audio and video files in any format is prohibited.
- Download and install any applications on the faculty computers.
- Play computer games using network facilities.
- Make excessive use of the facilities.
- Let a third party use the facilities (including fellow students).
- Do damage to or obstruct other users or equipment linked to the World Wide Web.
- Disrespect other people’s privacy, for example by sending information under a false name.
- Become a member of a mailing list outside the faculty without permission of the “dutwmail director”. This rule only applies to students.
- Distribute or show material that can be regarded as offensive, for example insulting phrases or pornographic images or movies.

Sanctions:

- The account is deactivated immediately after a violation has occurred.
- In case of serious or repeated violations: prohibition of the use of ICT facilities for up to a year.
- In case of any breach of the law, this will be reported to the police.
- All claims as a result of violations will be passed on to the violator.

## 3 Facilities

In this study guide, locations in the faculty building are indicated by means of a number and a letter between brackets which can be found on the map on the campus site of 3mE > Facilities. The floor is also indicated (BG= ground floor, 1st = first floor, etc.).

### 3.1 LECTURE ROOMS / MEETING ROOMS

Lecture rooms are used for lectures, presentations and instruction. The table below summarises all lecture rooms, giving their capacity and location.

Meeting rooms are available for meetings, discussions etc. for small groups of students. Reservations can be made at the Education and Student Affairs desk.

Room	Capacity	Location
A	300	6, BG
B	200	6, BG
C	150	6, BG
D	150	6, BG
E	70	6, BG
F	70	6, BG
J	50	8D, 1st
K	30	8G, 1st
L	30	8G, 1st
P	40	4

### 3.2 INDIVIDUAL STUDY FACILITIES

Individual study places are available at several locations in the faculty. Some of these are equipped with computers. These places are free to use, without a reservation. Places should be left clean and tidy.

In addition to the study places at the Faculty, there are individual study places in the central library. In the library you are expected to observe silence. There, the same rules apply as those for the faculty study places.

### 3.3 COMPUTER ROOMS

In addition to the computers at the study places, computers are also available in the computer rooms.

All computers provide access to the Internet. The computer rooms are open for use by students, unless they are being used for teaching. In that case, there is restricted access. A schedule on the door of each computer room shows when the room will be in use. The table below gives an overview of all computer rooms and their location.

Room	Location
Athena	building part 4, 1 <sup>st</sup>
Parthemus	building part 4, 1 <sup>st</sup>
Pallas	building part 4, 1 <sup>st</sup>
Design studios	building part 8G, BG

### 3.4 RESEARCH FACILITIES

The faculty has a number of research laboratories. Students may perform part of their studies in these laboratories, like the MSc thesis or a laboratory exercise. Otherwise, the laboratories are used for research activities of PhD students and staff.

#### Laboratory for Systems and Control

The laboratory of DCSC is situated in building 5A on the ground floor. Besides experimental setups it also provides office locations for MSc students. There are several experimental setups used for both teaching and research. All setups are provided with real-time control facilities in the form of either DS1102/3 interface cards from dSpace or with PCI-1711 interface cards from Advantech. Data acquisition and real-time control are implemented through Matlab/Simulink software.

**Contact** Laboratory manager: ing. R. van Puffelen  
Location: 5, BG

#### Materials Sciences Laboratory

**Contact** Laboratory manager: to be announced  
Phone: to be announced  
Location: to be announced



#### Fluid Mechanics laboratory

**Contact** Laboratory manager: B v.d. Velden  
Phone: +31 (0)15 27 82892  
Location: Leeghwaterstraat 21

#### Delft Bio-robotics Laboratory

**Facilities** Several bi-pedale robots  
**Contact** Laboratory manager: dr.ir. M. Wisse  
Phone: +31 (0)15 27 86585  
Location: 5, 1st , room 03-L

#### Engineering Dynamics Laboratory

**Facilities** Dynamic test equipment and analyzing systems  
**Contact**  
Phone laboratory: +31 (0)15 27 89394  
Phone manager: +31 (0)15 27 86739  
Location: 5, BG, room 07

#### Laboratory for Precision Manufacturing and Assembly

**Contact** ir. J.J.L. Neve  
Phone: +31 (0)15 27 86581  
Location: Leeghwaterstraat 37b

#### Laboratory for process equipment & Thermal Power Engineering

**Facilities** Pilot scale research equipment and utilities, Analytical equipment, Computational Tools  
**Contact** Laboratory manager: J. v. Os  
Phone: +31 (0)15 27 86921  
Location: API building, Leeghwaterstraat 44

#### Mechanics of Materials Laboratory

**Facilities** Test machines and analyzing equipment  
**Contact** Phone: +31 (0)15 27 89394 / 89424  
Location: 5, BG, room 07

## Tribology Laboratory

**Facilities** Tribological Test Equipment

**Contact** Laboratory manager: B. Hoevenaar

Phone: +31 (0)15 27 86805

Location: 5, BG, room 16

## 3.5 LECTURE NOTES AND BOOKS

Most lecture notes required for courses at the faculty can be bought at the 'repro', as well as some book and office supplies. Books are also available from the student society 'Leeghwater' ([www.leeghwater.nl](http://www.leeghwater.nl)) and VSSD ([www.vssd.nl](http://www.vssd.nl)).

Opening hours repro: Monday to Friday, 9:00 - 16:00.

Website: [www.io.tudelft.nl/repro/](http://www.io.tudelft.nl/repro/)

Tel: +31 (0)15 27 83062

Room: 10, BG (see campus site 3mE > Facilities)

For courses at other faculties, lecture notes can be bought at the faculties concerned:

- Aerospace Engineering  
Location: 1st floor  
Tel: +31 (0)15 27 81250
- Applied Physics  
Room no. C 057  
Tel: +31 (0)15 27 87992
- Civil Engineering  
Tel: +31 (0)15 27 81727
- Management of Technology  
Location: ground floor, next to entrance  
Tel: +31 (0)15 27 86373
- Electrical Engineering, Mathematics and Computer Science (EWI)  
Room 350  
Tel: +31 (0)15 27 87855



## 3.6 CATERING

The faculty offers a variety of catering facilities.

### Canteen

The faculty canteen serves a wide range of lunch choices. The canteen can be found at location 10, BG.

### Coffee corner

The coffee corner offers quick snacks. The coffee corner is situated near the main entrance (8F). Chairs, tables and couches are available. Drinks and candy machines are situated opposite the coffee corner. Paying at these machines is only possible with the electronic chip card 'or chipknip'.

### Faculty room

The faculty room is the place to hold symposia, meetings or graduation parties ("afstudeerborrels"). A reservation can be made at the Service Desk of the Faculty 3mE.

### 't Lagerhuysch

't Lagerhuysch is situated below ground level in section 8B, with access from the square in front of the faculty. Graduation parties (afstudeerborrels) can be held in the Lagerhuysch, but also symposia and meetings. The student societies Gezelschap Leeghwater and William Froude regularly organise activities. A route description to the Lagerhuysch and a reservation form can be found on their website: [www.lagerhuysch.tudelft.nl](http://www.lagerhuysch.tudelft.nl).

### Aula Congress Centre

The Aula Congress Centre of TU Delft offers a variety of catering facilities. They are open for lunch from 11.30 to 13.30, and for dinner from 16.30 to 19.30.

## 3.7 MAP OF THE FACULTY

This guide mentions numbers, indicating locations in the faculty building. As an extensive map could not be included in this guide, please visit the 3ME website to view the map: [campus.3me.tudelft.nl](http://campus.3me.tudelft.nl) > Facilities.

## 4. Course Descriptions

Course descriptions of MSc courses are not part of this guide. Detailed information is available in the Digital Study Guide via the Study Information System (SIS) on [www.tudelft.nl/sis](http://www.tudelft.nl/sis)

## 5. Course and Examination Regulations / Regulations and Guidelines for the Board of Examiners

The Course and Examination Regulations and the Regulations and Guidelines for the Board of Examiners are available on [campus.3me.tudelft.nl](http://campus.3me.tudelft.nl)

