Master Systems and Control

Paula Verbeek – Academic advisor AT, SET & S&C
August 2020
Welcome to Systems and Control!

**WHO ARE WE?**

<table>
<thead>
<tr>
<th>Camilo Rindt</th>
<th>Paula Verbeek</th>
<th>Marike Koopmans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program director</td>
<td>Academic advisor</td>
<td>Program coordinator</td>
</tr>
<tr>
<td><a href="mailto:C.C.M.Rindt@tue.nl">C.C.M.Rindt@tue.nl</a></td>
<td><a href="mailto:academic.advisor.at.sc.set@tue.nl">academic.advisor.at.sc.set@tue.nl</a></td>
<td><a href="mailto:M.Koopmans@tue.nl">M.Koopmans@tue.nl</a></td>
</tr>
<tr>
<td>GEM-Z 2.12</td>
<td>GEM-Z 1.118</td>
<td>GEM-Z 1.120</td>
</tr>
</tbody>
</table>
STUDENT MEETINGS - YR 1

Goals:
- Sharing experiences at the TU/e and in the Master’s program
- Sharing information about what you need to arrange for the next stage of your Master’s program
- Community feeling

Topics Master Kick-off, Specialization and Q meetings:

<table>
<thead>
<tr>
<th>Master Kick-off (August)</th>
<th>Specialization meeting S&amp;C</th>
<th>Q1 meeting (October)</th>
<th>Q2/3 meeting (February / March)</th>
<th>Q4 meeting (May / June)</th>
</tr>
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<tbody>
<tr>
<td>• Program Introduction</td>
<td>• Specialization choice - MAP</td>
<td>• Evaluation</td>
<td>• Evaluation</td>
<td>• Evaluation</td>
</tr>
<tr>
<td>• Specialization choice - MAP</td>
<td>• Information session about specialization options</td>
<td>• Specialization choice - MAP</td>
<td>• Quality assurance: course evaluations, NSE enquete</td>
<td>• Internship</td>
</tr>
<tr>
<td>• Information &amp; support</td>
<td>• September 8th 14.30 - 17.00</td>
<td>• To do list</td>
<td>• Specialization and mentor</td>
<td>• Gradation project</td>
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<td></td>
<td></td>
<td>• Registration exams and Q2 courses</td>
<td>• Fraud</td>
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<td>• Fraud basics</td>
<td>• Skills Lab</td>
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ONLINE EDUCATION GUIDE

https://educationguide.tue.nl/

Go to:

• Graduate School
• Master’s Programs
• Systems and Control

ALL PROGRAM INFORMATION!
4INFOSC (CANVAS, MANDATORY)
PROGRAM COMMITTEE SYSTEMS AND CONTROL

Staff members:
• Paul van den Hof (chairman)
• Tom Oomen
• Alessandro Saccon

Student members:
• Chris Verhoek
• Stefan Nechita
• Koen van de Camp
What does OCSC do?

- Part of S&C program quality assurance
- OER (Program and Examination Regulations)
- Ensures correct course scheduling and pinpoints conflicts
- Have information, feedback, approval, consent rights over several master’s discussion points.

Why we need you?

- Direct students’ feedback in the SC master’s track
- Program quality <-> knowledge and skills quality
- Soft skills development
INTRODUCTION MASTER PROGRAM S&C

• Program introduction
• Specialization choice - MAP
• Information & support
SYSTEMS AND CONTROL

- Technological contributions in many fields
- Hidden but crucial technology
- Generic theory for many applications
- Applications in high tech industry, communication, health, 3D printing, etc...

Communication
Additive manufacturing
Health and care
Aviation systems

Automotive applications
Energy distribution
SYSTEMS AND CONTROL: AN INTERDISCIPLINARY STUDY

Partner universities:

- TU/e Mechanical Engineering
- TU/e Electrical Engineering

TU/e

Delft University of Technology
Technische Universiteit Eindhoven
University of Twente
Wageningen University
4TU
# PROGRAM OVERVIEW

<table>
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<tr>
<th>1st year</th>
<th>2nd year</th>
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<tr>
<td>Core program (25 EC)</td>
<td>Internship</td>
</tr>
<tr>
<td>Specialization courses (20 EC)</td>
<td>15 EC</td>
</tr>
<tr>
<td>Free electives (incl. homologation, 15 EC)</td>
<td>Graduation project</td>
</tr>
<tr>
<td></td>
<td>45 EC</td>
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</table>

**1st year**
- Core program (25 EC)
- Specialization courses (20 EC)
- Free electives (incl. homologation, 15 EC)

**2nd year**
- Internship: 15 EC
- Graduation project: 45 EC
EDUCATION

Core courses (25 EC), compulsory:

• Control engineering
• System theory for control
• Modeling dynamics or Multibody and non-linear dynamics
• System identification
• Integration project S&C
Modeling dynamics (5CSA0) or Multibody and non-linear dynamics (4DM10)?

Both courses provide the students with an in-depth introduction to nonlinear dynamics.

5CSA0 (EE):
- covers a broad scope of applications and treats the modeling and analysis of general physical models, networks of models, the role of passivity and conservation laws and a broad range of stability properties in nonlinear dynamics.

4DM10 (MW) focuses on:
1. dynamic modelling and analysis of mechanical systems which is key in the fields of robotics, vehicle dynamics, high-tech systems and control of mechanical systems
2. the analysis of generic nonlinear dynamical systems.
FREE ELECTIVES (15 EC)

Courses on Master level intended to broaden or deepen your knowledge

• extra specialization courses.
• all TU/e courses on Master level
• an extension of the internship with 5 EC
• deficiency courses
• homologation modules that are offered for S&C, and complementary to the student’s background (see educationguide.tue.nl)
FREE ELECTIVES (15 EC)

Be aware:

- No overlap between courses allowed (in free electives, core and specialization)
- You need approval of the courses

TU/e courses on Bachelor level only if:

- indicated as necessary by the department admission committee upon admission to the program and/or
- necessary as personal deficiency courses and/or
- necessary as homologation module for specific groups of students
HOMOLOGATION COURSES

Opportunity to work on deficiencies

- **4MW20** Matlab simulink (2,5 EC, Q1)
  - For international / non-TU/e students without matlab experience

- **4SC060** Dynamics of mechanical systems (2,5 EC, Q1)
  - Strongly advised for students with an electrical engineering background

These and other deficiency courses on bachelor level can be included in free electives (permission examination committee needed, 15 credits max, discuss with your mentor)
**FIRST YEAR SCHEDULE**

<table>
<thead>
<tr>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control engineering</td>
<td>Multi-body and Non-Linear Dynamics*</td>
<td>System Identification</td>
<td>Integration project</td>
</tr>
<tr>
<td>System Theory for Control</td>
<td>choice</td>
<td>choice</td>
<td>choice</td>
</tr>
<tr>
<td>Modeling Dynamics *</td>
<td>choice</td>
<td>choice</td>
<td>choice</td>
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<tr>
<td>choice (homologation?)</td>
<td>choice</td>
<td>choice</td>
<td>choice</td>
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*Students have to choose one of these 2 courses

Choice = free elective or specialization
ONLINE AND ON CAMPUS EDUCATION S&C - Q1, Q2

Q1

4CM00 Control Engineering (W) - Timeslot C -
- lectures
- practical work

54CM10 System theory for control (W) - Timeslot B
- lectures
- instruction

5CSA0 Modeling Dynamics* (EE) - Timeslot D
- lectures
- instruction

4WM20 Homologation Matlab Simulink (W) - Timeslot E1
- lectures
- instruction

4SC060 – Homolog. dynamics of mech. systems - Timeslot E2
- lectures
- instruction

* Student has to choose one course

Q2

4DM10 Multi-body and Non-linear Dynamics* (W) - Timeslot A -
- lectures
- guided self-study

Specialization course - Timeslot B, C, D, E -
- lectures

Specialization course - Timeslot B, C, D, E -
- lectures

Online
On campus

Exams?
INTRODUCTION MASTER PROGRAM S&C

- Program introduction
- Specialization choice - MAP
- Information & support
## PROGRAM OVERVIEW

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</table>

**15 EC**

**45 EC**
• **Control Systems Technology /**
  prof. Steinbuch
  prof. Heemels

• **Dynamics & Control /**
  prof. Nijmeijer

• **Electro-mechanics and Power Electronics /**
  prof. Lomonova

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**MECHANICAL ENGINEERING DEPARTMENT**

- High precision and accuracy / hybrid and network control / nuclear fusion / systems engineering

**ELECTRICAL ENGINEERING DEPARTMENT**

- Non linear control / automotive / vehicle dynamics / cooperative driving / manufacturing networks
- Hybrid and electrical driving / electromagnetics / actuator design / power electronics
- (fundamental): process control / 3D printing / electrical power systems / dynamic networks

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21 Master Kick-off 2020 – Systems and Control
ELECTIVES FOR SPECIALIZATION

- 15 EC for specialization courses
- Choose from the list ‘specialization courses S&C 2020-2021’
- Courses are linked to (offered by) a section
- You can choose every specialization course from the list!
- Most courses are 5 EC, some are 2.5 EC
- Discuss with your mentor which courses suit your specialization and personal profile
MASTER ALLOCATION PROCEDURE (4MAPSC)

A procedure designed to allocate students to sections:

- affects all students S&C

For more detailed information go to educationguide.tue.nl
<table>
<thead>
<tr>
<th>Centralized organized specialization information meeting</th>
<th>Possibility for sections to organize an extra information meeting</th>
<th>1st, 2nd and 3rd preference for a section in OSIRIS STUDENT: 4MAPAT / 4MAPSC / 4MAPSET</th>
<th>Selection round</th>
</tr>
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<tbody>
<tr>
<td>September 8th (Tuesday)</td>
<td>Week 3 – 4 of Q1</td>
<td>15 – 27 September 2020</td>
<td>Week 5 of Q1</td>
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</tbody>
</table>

Specialization meeting S&C
September 8th
14.30-17.00 (Tuesday)
COACHING

Mentor (lecturer)
• Supervises you when making a choice for your specialization electives and when composing your curriculum
• Supervises you when looking for an internship & graduation project
• Discusses your plans to improve your professional skills
• Supports you in determining your career path

Please make sure to contact your mentor to discuss these topics

Thesis supervisor
Is responsible for your graduation project
COACHING

Academic advisor: Paula Verbeek
Gemini-Zuid 1.118
academic.advisor.at.sc.set@tue.nl

• Advice and help to enhance study progress (organise your courses; make a planning; information about electives or traineeship, personal circumstances,……)
• Information about how to organise study issues and regulations
• Personal and confidential appointments
STUDENT MENTORS

1. Help new students to get acquainted with each other, the master’s program, TU/e and the city of Eindhoven

2. Help new students to get acquainted with studying at TU/e

3. Keeping an eye on new students: are they doing okay?
INTRODUCTION MASTER PROGRAM S&C

• Program introduction
• Specialization choice - MAP
• Information & support
ONLINE EDUCATIONAL SYSTEMS

- **MyTU/e: online portal**
  - Education guide: Program overview, elective courses list, homologation courses, procedures, examination committee, teaching and examination rules
  - Osiris: course and exam registration, progress overview
  - Canvas: Learning management system, course information, course materials, assignments, 4INFOSC, etc.
  - MyTimetable: personal time schedule

More information + videos: [https://educationguide.tue.nl/studying/services/online-systems/](https://educationguide.tue.nl/studying/services/online-systems/)
INFORMATION ABOUT PROGRAM AND COURSES

- educationguide.tue.nl (click “Graduate School”) or via intranet site https://intranet.tue.nl

- Program overview
- Elective courses list
- Homologation courses
- Procedures
- Examination committee
- Teaching and examination rules
COURSE INFORMATION

Canvas and OSIRIS:

• Program news

• Course info and communication: schedule, lecture notes, examples of exams

• Registration for courses and exams (in time!)
COURSE REGISTRATION / EXAM REGISTRATION

You have to register for your courses and exams in Osiris!

- **Registration courses**
  - 20 working days before start quarter
  - Missed the deadline? AKR deadline
    → Up to fifteen working days prior to quarter 2, 3 and 4 = €20,- administration costs
    → Missed this extended AKR deadline? Then registration is not possible anymore

- **Registration Exams**
  - You are only allowed to take the exam with an exam registration
  - You can withdraw until 5 working days prior to the exam period
  - You have to register for the retake (this is not done automatically)

### Deadlines

<table>
<thead>
<tr>
<th>Quater</th>
<th>Registration course</th>
<th>Administration Cost</th>
<th>Registration exams (only graduate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15-06-2019 t/m 25-06-2019</td>
<td>26-06-2019 t/m 29-06-2019 (17.00h)</td>
<td>t/m 13-10-2019</td>
</tr>
<tr>
<td>2</td>
<td>15-06-2019 t/m 13-10-2019</td>
<td>14-10-2019 t/m 18-10-2019 (17.00h)</td>
<td>t/m 05-01-2020</td>
</tr>
<tr>
<td>3</td>
<td>15-11-2019 t/m 05-01-2020</td>
<td>07-01-2020 t/m 10-01-2020 (17.00h)</td>
<td>t/m 22-03-2020</td>
</tr>
<tr>
<td>4</td>
<td>16-11-2019 t/m 22-03-2020</td>
<td>23-03-2020 t/m 27-03-2020 (17.00h)</td>
<td>t/m 07-06-2020</td>
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</table>
BOOKS AND READERS

• Education guide: course information and study material

• Readers are available in Canvas (or in the webshop)

• Some books are offered for reduced prices by study associations (Simon Stevin: http://tuestudieboeken.nl ) (TUEboeken.nl) Do not buy them in advance!!
<table>
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<tr>
<th>Who</th>
<th>What</th>
<th>Where</th>
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<tbody>
<tr>
<td>Academic Advisor</td>
<td>• Study related questions and problems</td>
<td>Paula Verbeek: <a href="mailto:academic.advisor.at.sc.set@tue.nl">academic.advisor.at.sc.set@tue.nl</a></td>
</tr>
<tr>
<td></td>
<td>• Study Progress</td>
<td>Gemini Zuid 1.118</td>
</tr>
<tr>
<td></td>
<td>• Study Skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Planning</td>
<td></td>
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<tr>
<td></td>
<td>• Personal circumstances</td>
<td></td>
</tr>
<tr>
<td>Lecturers</td>
<td>• Course content and Course information</td>
<td>Don’t hesitate to ask questions during lectures in Q1</td>
</tr>
<tr>
<td>Study Management Advisors</td>
<td>• For extra support in developing study skills and planning skills</td>
<td>• Individual sessions: <a href="https://educationguide.tue.nl/organization/advisors-and-tutors/study-management-advisor/">https://educationguide.tue.nl/organization/advisors-and-tutors/study-management-advisor/</a></td>
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<td>• Courses / training: <a href="https://educationguide.tue.nl/broadening/group-training-sessions/">https://educationguide.tue.nl/broadening/group-training-sessions/</a></td>
</tr>
<tr>
<td>Student Counselor / Student Psychologist</td>
<td>• (extra) facilities, for example about studying with special needs, extra tentamation time or (re-)enrollment</td>
<td><a href="https://educationguide.tue.nl/organization/advisors-and-tutors/student-counsellor/">https://educationguide.tue.nl/organization/advisors-and-tutors/student-counsellor/</a></td>
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## QUESTIONS / HELP

<table>
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<tr>
<th>Who</th>
<th>What</th>
<th>Where</th>
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<tbody>
<tr>
<td>Education Office AT, SET, S&amp;C</td>
<td>• Program results and grades&lt;br&gt;• Forms&lt;br&gt;• Administrative procedures</td>
<td>Gemini Zuid GEM-Z 1.110&lt;br&gt;Opening hours: 12.00 – 14.00 (Mon – Fri)&lt;br&gt;<a href="mailto:CSA.AT.SC.SET@tue.nl">CSA.AT.SC.SET@tue.nl</a></td>
</tr>
<tr>
<td>Education Guide</td>
<td>• Program website</td>
<td><a href="https://educationguide.tue.nl">https://educationguide.tue.nl</a></td>
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## QUESTIONS / HELP

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<tr>
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<tbody>
<tr>
<td>Osiris</td>
<td>• Program overview&lt;br&gt;• Overview progress&lt;br&gt;• Course registration and information&lt;br&gt;• Exam registration</td>
<td>Via portal My Tue&lt;br&gt;Helpdesk: <a href="mailto:osiris@tue.nl">osiris@tue.nl</a></td>
</tr>
<tr>
<td>Canvas</td>
<td>• Course supporting system, additional course information, assignments, group discussions, online digital material, etc.</td>
<td>Via portal My Tue&lt;br&gt;Helpdesk: <a href="mailto:canvas@tue.nl">canvas@tue.nl</a></td>
</tr>
<tr>
<td>ESA</td>
<td>• TU/e &amp; program enrollment&lt;br&gt;• Tuition fees&lt;br&gt;• AKR deadline</td>
<td><a href="mailto:esa@tue.nl">esa@tue.nl</a>&lt;br&gt;Frontoffice desk at Metaforum</td>
</tr>
<tr>
<td>And more</td>
<td>• NoteBook service centrum&lt;br&gt;• ICT support&lt;br&gt;• Library&lt;br&gt;• Book My space&lt;br&gt;• Printing&lt;br&gt;• ..........</td>
<td>Metaforum&lt;br&gt;SEL/SOL (Level 3A)</td>
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HOW TO PREPARE FOR YOUR MSc PROGRAM?

➢ Be informed
   • Read all information about the master’s program at http://educationguide.tue.nl ➔ check the ‘To-do list’!

➢ Course registration / exam registration
   • Subscribe for master’s courses and exams (check deadlines)

➢ Quarter 1
   • Start following courses from 31 August on (check My Timetable)
   • Join the mandatory meeting about Occupational Health Hazard and CANS
   • Join the specialization meeting on September 8th and participate in the MAP Procedure
   • **ENJOY YOUR MSc PROGRAM!**