Master Sustainable Energy Technology (SET)

Camilo Rindt (Program Director SET)
Silvia Nieddu (student SET, 1st year)
Welcome to Sustainable Energy Technology!

Today’s program:
• Presentation (45 min)
  • Master program SET
  • Pre-Master program SET
  • Master program SELECT
• Time for questions (15 min)

Department tour (30 min): 17:00 – 17:30
CONTENT
MASTER SUSTAINABLE ENERGY TECHNOLOGY (SET)

• SET: why?
• SET: what?
• SET: specializations
• After graduation
• Application / More information
• SET Pre-Master program: what?
The most important challenge: ENERGY

**Humanity’s Top Ten Problems for next 50 years**

1. ENERGY
2. WATER
3. FOOD
4. ENVIRONMENT
5. POVERTY
6. TERRORISM & WAR
7. DISEASE
8. EDUCATION
9. DEMOCRACY
10. POPULATION

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>2003</td>
<td>6.3</td>
<td>Billion People</td>
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<tr>
<td>2050</td>
<td>8-10</td>
<td>Billion People</td>
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</table>

Source Richard Smalley Energy & Nanotechnology Conference
Future power system?
Solar team Eindhoven: TU/e solar family car “Stella Vie”
• Energy days
• Energy Now congresses
• Energy cafes
• Energy challenges
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Master Sustainable Energy Technology
*Driven by sustainable energy*

- Focus on technological aspects of sustainable energy
- System integration approach
- Program is characterized by 4 themes

- SOURCES, FUELS AND STORAGE
- ELECTRICAL POWER SYSTEMS
- APPLICATION IN THE BUILT ENVIRONMENT
- ENERGY & SOCIETY
Master Sustainable Energy Technology

Specialists from many fields are involved

Cooperation between 6 departments:
• Mechanical Engineering (ME, coordinating department)
• Built Environment (BE)
• Electrical Engineering (EE)
• Industrial Engineering and Innovation Sciences (IE&IS)
• Applied Physics (AP)
• Chemical Engineering and Chemistry (CEC)
Master Sustainable Energy Technology

• Duration: 2 year (120 credit points)
• Time of entry: September (February)
• Entry for TU/e students: every month
• Language: English
• Degree: Master of Science (MSc)
• Coaching: mentor & skills-lab for personal growth
# Program overview – core program

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Core program (30 EC)</th>
<th>Specialization (15 EC)</th>
<th>Homologation / Electives (15 EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>Internship (15 EC)</td>
<td>Graduation Project (45 EC)</td>
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</table>
SET - core program

- Sustainable Energy Sources (W)
- Energy, Economy & Society (IE&IS)
- Electrical power engineering and system integration (EE)
- Building performance and energy systems simulation (B)

System integration project
System integration project (10 EC)

“Multidisciplinary project team (+/- 5 members) in collaboration with stakeholders (e.g. industry, municipality)”

“group assignment, in which sustainable energy has to be applied to a concrete, real-world problem”

“example assignment: develop a high-level sustainable energy plan for the region Peel en Maas (e.g. electrical network infrastructure, sustainable electricity, greenhouses, and heat infrastructure, green farmers)”
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## Program Overview – specialization

<table>
<thead>
<tr>
<th>Year</th>
<th>Core program (30 EC)</th>
<th>Specialization (15 EC)</th>
<th>Homologation / Electives (15 EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td></td>
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<tr>
<td>Year 2</td>
<td>Internship (15 EC)</td>
<td>Graduation Project (45 EC)</td>
<td></td>
</tr>
<tr>
<td>Energy &amp; society</td>
<td>Electrical power systems</td>
<td>Application in built environment</td>
<td>Sources, fuels &amp; storage</td>
</tr>
<tr>
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<td>--------------------------</td>
</tr>
<tr>
<td>Human Technology Interaction (IE&amp;IS)</td>
<td>Electro mechanics and Power Electronics (EE)</td>
<td>Energy Technology (ME)*</td>
<td>Transport in Permeable Media (AP)</td>
</tr>
<tr>
<td>*These research groups have a cap</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>**Only for students with bachelor's degree Chemical Engineering or comparable</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Molecular Science and Technology (CEC)*</td>
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<td></td>
<td>Stimuli-responsive Functional Materials and Devices (CEC)**</td>
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<td></td>
<td></td>
<td></td>
<td>Inorganic Materials Chemistry (CEC)**</td>
</tr>
</tbody>
</table>

The research group is the basis for your choice for specialization courses, internship, thesis project and possibly your free space.
Specialization themes

- Sources, fuels & storage (W, AP, CEC)
- Electrical power systems (EE)
- Application in built environment (B, W)
- Energy & society (IE&IS)
Sources, fuels & storage

Mechanical Engineering

- Thermochemical Heat storage
- Geothermic
- PhotoVoltaic Thermal panels
- Metal fuels
Sources, fuels & storage
Applied Physics and Chemical Engineering & Chemistry

- Crystalline silicon and thin film solar cells
- Polymer solar cells
Electrical power systems

Electrical Engineering

The TU/e Power Quality Laboratory

horizontal power flow

vertical power flow
Application in built environment
Mechanical Engineering & Built Environment

Towards a sustainable energy-positive built environment with indoor environment quality optimized for health, comfort and/or productivity.

Climate adaptive building shells
Energy & society
Industrial Engineering and Innovation Sciences

How technology works in the real world:
Development, application and diffusion of technology.

Socio-economic context
Biomass, solar, smart grids, built environment, mobility
Mix of social and engineering sciences
How technologies work in practice in a socio-economic context, taking into account stake-holders
Examples of graduation projects

• ‘Optimal Energy Trading using Reinforcement Learning for an Energy Storage System’
• ‘Integrated local energy systems in Dutch residential areas’
• ‘Thermal Modelling and experimenting on Solarus Power Collector’
• ‘Electric drive system design toward integration of variable flux reluctance machines and transmission systems’
• ‘Development and application of a reactive forefield for Ca-doped MgCl2 hydrates for thermochemical heat storage’
• ‘Atomic layer deposited nickel oxide for perovskite solar cells’
• ‘Investigating Energy Saving Potential of Switching Solar Absorbance Coatings on Buildings’
Coaching

• Mentor program
• Full, associate or assistant professor
• Skills-lab for personal development
EXCHANGE PROGRAM: DTU SE - TU/e SET

https://www.dtu.dk/english/Education/Incoming-students/Exchange
EXCHANGE PROGRAM: DTU SE - TU/e SET

WHAT

• For TU/e-SET students: yr 1 at TU/e, yr 2 at DTU
  For DTU-SE students: yr 1 at DTU, yr 2 at TU/e

• 5 students per year, max 2 students per section

• Involved research groups:
  • Energy Technology & Fluid Dynamics (Mechanical Engineering)
  • Electrical Energy Systems (Electrical Engineering)
  • Power & Flow (Mechanical Engineering)
  • Plasma & Materials Processing (Applied Physics)
EXCHANGE PROGRAM: DTU SE - TU/e SET

WHY IS THIS A OPPORTUNITY?

• International experience
• More possibilities to construct an optimal course portfolio making use of courses offered at DTU
• Opportunity to study at two world-leading universities
• Get a supplement in your MSc diploma
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After graduation:

Two year PDEng program Smart Buildings and Cities (SB&C)
PhD program of four years
Job in consultancy, government, research or industry

A recent survey showed:

• 95% had a job
• 56% within 1 month
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Application master degree programs

Dutch students:
• More info about admissions: www.tue.nl/admission
• Application via www.studielink.nl
• Questions: studeren@tue.nl

Deadline
1 May 2020
Application master degree programs

International students:
• Check [www.tue.nl/admission](http://www.tue.nl/admission) for the requirements
• Apply via online application form
• Application fee of € 100 per application (non refundable)
• Application procedure takes +/- 8 weeks
• You will be informed by email about the outcome of your application
• Questions: [io@tue.nl](mailto:io@tue.nl)

Deadline
1 May 2020
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Pre-Master Sustainable Energy Technology

- Duration: 1 years (30 EC)
- Time of entry: September
- Language: English
Pre-Master Sustainable Energy Technology

Why?
• Can you handle the level?
• Eliminate deficiencies

What?
• Program of 30 EC, to be achieved within one year
• Focus on mathematics (10 EC)
## SET pre-Master program 2020-2021

<table>
<thead>
<tr>
<th>Compulsory courses</th>
<th>30 EC</th>
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<tbody>
<tr>
<td>quarter 1</td>
<td></td>
</tr>
<tr>
<td>2DL60</td>
<td>Linear Algebra</td>
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<tr>
<td>2WBB0</td>
<td>Calculus variant 2</td>
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<tr>
<td>quarter 2</td>
<td></td>
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<tr>
<td>2DL40</td>
<td>Advanced Calculus I</td>
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<tr>
<td>4PB00ONL</td>
<td>Heat and Flow (online)</td>
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<tr>
<td>4EB00</td>
<td>Thermodynamics</td>
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<tr>
<td>quarter 3</td>
<td></td>
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<tr>
<td>4GB10</td>
<td>Combustion Engine</td>
</tr>
<tr>
<td>4EC10</td>
<td>Dynamics of energy systems</td>
</tr>
<tr>
<td>quarter 4</td>
<td></td>
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</tbody>
</table>

### Additional training (no EC’s):
- RSI-training (mandatory)
- Arbo en milieu (mandatory)
- Matlab (strongly recommended)
Difference Bachelor WO & HBO (in general)

University of technology:
- Developing new technology and design methods to solve technological problems
- Education focusses on (mathematical and physical) concepts and their implications
- Most students only do internal research projects
- All lecturers are involved in scientific research

University of applied science:
- Applying existing technology and design methods to solve technological problems
- Education focusses on practical applications
- Multiple internships in companies/industry
How to prepare during your bachelor’s program?

• A pre-master’s program is more work than one might think, you must be willing to work hard
• It is not advised to do the pre-master in combination with a part-time job in the industry
• Check the additional entry requirements regarding mathematics and English
• Subscription for a pre-master via Studielink before May 1st
Admission HBO bachelors to pre-Master

Depending on HBO degree:

→ Direct admission:
  • Mechanical engineering
  • Applied physics
  • Electrical engineering
  • Chemical engineering and chemistry
  • Luchtvaarttechnologie / aviation
  • Mechatronics

→ Individual admission by admission committee
  • Send grades and course information HBO bachelor to Admission.Mech@tue.nl
More information

Go to the stand in Auditorium!

Or contact:

- Master SET: https://www.tue.nl/en/education/graduate-school/master-sustainable-energy-technology/
- Are you a prospective student and would you like to be kept informed about our study programs and upcoming events? Then register at your personal homepage MyStart@TU/e