Master of Science in Engineering

Sustainable Product Creation (académique)
“This comprehensive education on the complete product creation process will prepare you for a successful career as an engineer.”

Peter Plapper
Course director
Professor of Engineering Science

© Michel Brumat / University of Luxembourg
Introduction
The Master of Science in Engineering – Sustainable Product Creation provides engineering students with a comprehensive understanding of all relevant aspects of the product creation process. The courses cover market segment definition, product design and calculation, product manufacturing and product recycling and re-use. The classes include all aspects of sustainable product creation and have an interdisciplinary scope with mechanical and electrical know how.

The findings of a first employability study (conducted by the University together with the “Institut Universitaire International de Luxembourg” and Deloitte Tax & Consulting) show that 95% of the students who accomplished the Engineering Bachelor in October 2010 at the University of Luxembourg, were able to find a job within the first six months.

Degree
Master académique

Duration
4 semesters / 120 ECTS

Teaching language
English

Career opportunities
- Research and development at university, industry or public research institutes;
- Management position in industry;
- Leadership position in public administration or education.

Learning outcomes
- The graduate is capable of planning, designing and manufacturing products in a sustainable fashion in order to meet market demand;
- He/she is trained to apply all techniques, skills and modern engineering tools, which are required for engineering practice;
- He/she has a comprehensive understanding of engineering techniques and state-of-the-art methods.

Therefore this Master aims primarily at:
- Providing students with a profound (both detailed and broad) education in the domain of sustainable product creation;
- Enabling students to understand the impact of their engineering work with regards to sustainability;
- Preparing students for an international design, manufacturing or research career;
- Introducing students to current research topics and enabling them to contribute to this research;
- Fostering autonomous scientific work and problem solving;
- Teaching students a goal-oriented, well-structured working style;
- Enabling students to present and defend scientific results.
DISTINCTIVE FEATURES

Education in complete product creation chain

The first unique feature of the Master of Science in Engineering is its aim to educate the student in the complete process of product creation from market segment specification and product planning, via product design and manufacturing, to product usage, service and recycling.

Interdisciplinary engineering education

The Master will provide an interdisciplinary engineering education which covers both the mechanical engineering and mechatronic aspects of sustainable product creation. This allows the engineering student to gain a broad and profound knowledge of engineering skills.

Focus on energy, environment and sustainable growth

The Master of Science in Engineering aims to educate engineers who are conscious in the use of all resources, (e.g. energy efficiency, light weight design, assembly time), but are also trained to develop products that minimize waste of e.g. material, space or labour. Educating students with the skills to efficiently use all resources will enable them to create products using sustainable methods. Every course contributes to the awareness that product creation should focus on lean and sustainable use of all resources.
<table>
<thead>
<tr>
<th>SEM</th>
<th>COURS</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Product planning &amp; market segment definition (module)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Project Management</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Product Development (module)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Assessment of Finite Element Calculations</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Systematic Product Development</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>CAD &amp; CAE</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Matlab Programming</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Machine Design</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>Product Manufacturing (module)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Production technologies and industrial management</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>Supply Chain and Logistics</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>Product Usage and Recycling (module)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Life Cycle Assessment &amp; Eco design</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Product planning &amp; market segment definition (module)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Product Planning and Marketing for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Product Development (module)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Structural Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Research in Product Development</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Advanced Engineering Materials</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Advanced Control</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Machine Design Exercise</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Product Manufacturing (module)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Production Engineering</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Assembly &amp; testing technologies</td>
<td>3</td>
</tr>
</tbody>
</table>
**Internship**

10 weeks internship during the Bachelor’s degree or before the 3rd semester with industrial partners.

<table>
<thead>
<tr>
<th>SEM</th>
<th>COURS</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Product planning &amp; market segment definition (module)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Sensors and Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Product Manufacturing (module)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Robotics</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Lean Manufacturing Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Product Usage and Recycling (module)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Recycling, Life Cycle Assessment and Eco Design</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Electrical Energy Production Transportation and Distribution</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Non-Technical Subjects</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Scientific Writing and Presentation Skills</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Other</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Advanced Project / Case Study</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Master Thesis</td>
<td></td>
</tr>
</tbody>
</table>
The Research Unit in Engineering Sciences (RUES) is equipped with cutting-edge laboratory facilities for:

- Computer Aided Design and Engineering (CAD and CAE);
- Material testing equipment;
- Automation Lab with PLC testbed and mobile robots;
- Modal analysis equipment;
- Thermal camera;
- Rapid prototyping equipment, 3D scanner and 3D printer;
- High performance computer;
- Fiber Laser for welding and surface structuring;
- Industrial robots (Fanuc, KUKA and Schunk);
- Lean Management Laboratory;
- CNC Machines.
Research projects are currently carried out on:

- Self-guided, autonomous electric vehicles;
- Energy generation from bio-mass by fermentation;
- Laser beam joining of light weight structures;
- Analysis and reduction of noise in automotive systems;
- Product Development Process optimisation;
- CFD Simulation of multiphase systems;
- Efficiency increase for Supply Chain Management;
- Robotic assisted assembly of automobile components;
- Advanced electrical energy distribution in grids;
- Static and dynamic optimisation of biological and mechanical structures;
- Energy reduction in steel production.

The Master’s offers opportunities to contribute to these and other new research activities with the “Advanced case study” or the “Master Thesis”.

“Small study groups and close links to our research activities foster a stimulating learning environment.”
Requirements for Admission

Entry Requirements

Students from other universities

- Students with a “Bachelor of Science in Engineering” (academic degree), with the profile Mechanical Engineering or similar: These students have direct access to the Master’s programme.

- Students with a “Bachelor of Applied Science” (“Fachhochschule” degree), with the profile Mechanical Engineering, Mechatronic Engineering or similar: These students can apply to the Master of Science Engineering if they have a grade of at least 15 out of 20 Points (75%). The final decision as to whether these students can participate in the programme will be based on their academic record and the successful completion of mandatory courses.

Bridge Courses:

Semester 1 / Courses
- Analyse 1a, 1c (Real functions,...) / 5 ECTS
- Algèbre linéaire et applications / 5 ECTS
- Prob. & Statistiques 1 (Probability) / 2 ECTS

Semester 2 / Courses
- Analyse 2a, 2c (Integrals, Diff. eq.) / 5 ECTS
- Compléments d’algèbre linéaire / 5 ECTS
- Prob. & Statistiques 2 (Statistics) / 2 ECTS
- Technische Mechanik IV (Dynamics) / 4 ECTS

For more information see http://basi.uni.lu

- Students with another bachelor/master’s degree: These students can apply for the Master course when the level is at least the same as these students of the two groups mentioned above. Admission is based on a selection procedure. Mandatory bridge courses can be defined.

Students from the University of Luxembourg

- Students with a “Bachelor en sciences et ingénierie” (académique), filière Mechanical Engineering: These students have direct access to the Master’s programme.

- Students with a “Bachelor en ingénierie” (professionnel), filière Mechanical Engineering or Mechatronic Engineering: These students can apply to the Master of Science Engineering if they have a grade of at least 15 out of 20 Points (75%). The final decision as to whether these students can participate in the programme will be based on their academic record and the successful completion of mandatory upgrading courses.

Bridge Courses:

Semester 1 / Courses
- Analyse 1a, 1c (Real functions,...) / 5 ECTS
- Algèbre linéaire et applications / 5 ECTS
- Prob. & Statistiques 1 (Probability) / 2 ECTS

Semester 2 / Courses
- Analyse 2a, 2c (Integrals, Diff. eq.) / 5 ECTS
- Compléments d’algèbre linéaire / 5 ECTS
- Prob. & Statistiques 2 (Statistics) / 2 ECTS
- Technische Mechanik IV (Dynamics) / 4 ECTS

For more information see http://basi.uni.lu

If the number of applicants exceeds 25 students, they will be selected according to their academic record, motivation letter and reference letter.
Start of studies & enrolment

The study programme starts each year in September.

Enrolment period for European students is from middle of January to end of July (exact dates published on our web site).

Enrolment period for non-European applicants is from middle of January to end of April (exact dates published on our web site). It is recommended to apply as soon as possible due to the limited number of places.

Enrolment requires online registration, where the following documents are needed:

- ID photo;
- Copy of ID or passport;
- Copy (both sides) of social security card and validity date;
- Copy of University diploma(s) including grading (and official translation if other languages than French, German or English);
- A one page application letter;
- Detailed CV;
- Letters of recommendation can be added as an option;
- Only in case of doubt about the level of English of the applicant, we can ask for a B1-certificate (or TOEFL).

Questions may be addressed to:

- Regarding the enrolment procedure: the Service des Études et de la Vie Étudiante (SEVE);
- For administrative purposes (time-table, management of exams, grades, etc...), please contact the study secretary.
- For curriculum content and academia: the study director Peter Plapper.

Enrolment fee

200 € / semester

Enrolment procedure

All information relating to the application file can be find on our web site: www.uni.lu

For enrolment visit the University web site: http://www.uni.lu/etudiants/inscriptions_reinscriptions?

People who need a visa have to take into account that obtaining a visa can sometimes take several months. For the application of (cheaper) student housing it is wise to apply early.

For questions, please contact the study secretary or contact the course director directly. Contacts can be found on page 14 of this booklet.
THE UNIVERSITY OF LUXEMBOURG

Founded in 2003, the University of Luxembourg is the first and only university of the Grand Duchy of Luxembourg. Multilingual, international and research-oriented, it is also a modern institution with a personal touch. At the University of Luxembourg, students and staff come from all over the world. You will study together with people from over 100 different countries.

THE UNIVERSITY IN FIGURES*

- 6157 students
  - 3325 international students
  - 3288 undergraduate students
  - 1183 postgraduate students (Master)
  - 1141 other students
  - 545 PhD students
- 107 nationalities (students)
- 1,491 employees
- 233 professors, associate professors and senior lecturers
- 730 adjunct teaching staff
- 54 degree programmes
- 11 research units
- 3 faculties
- 2 interdisciplinary centres

* December 2014
SERVICE FOR STUDENTS

Student accommodation

The University provides accommodation in different areas of Luxembourg-city, Esch-sur-Alzette, Monderncange, Walferdange and Noertzange. The rooms at the Halls of residence are single furnished rooms with an average size of 14 m².

seve.logement@uni.lu

Sports, arts and culture

“Espace Cultures” organises and coordinates a broad range of cultural events at the university. If you are interested in cultural activities, you can join the University Choir, the University Chamber Music Ensemble, the student theatre group “Edudrame” or the dance group “Dance Cluster”.

“Espace Cultures” offers guided and sightseeing tours, study trips and exhibitions. You can even get free entrance for a number of cultural events.

“Campus Art” invites you to discover your own creativity. During the art workshops, you can explore different painting techniques, experimenting with light projections or create your own art works out of clay. There are no limits to your imagination!

The “Campus Sports” organises a broad range of sport activities for students: you can take fitness classes, play football, work out at the gym – aquajog or do some indoor climbing. The University of Luxembourg also has its own football team.

Language courses

Multilingual teaching is a key asset of our university. The majority of our degrees are taught in at least two languages. To help you prepare, the university offers at the start of each winter semester language courses in German, French and English.

COME AND VISIT US!

The University of Luxembourg organises each spring its annual Open Day where you can meet students and staff. You can take a campus tour or visit one of our many information sessions on our degrees which take place throughout the day.

Visit our website www.uni.lu for detailed information.

LIFE IN LUXEMBOURG

Five reasons to study in the Grand Duchy of Luxembourg

A European crossroad

• situated between France, Belgium and Germany
• one of the European Union’s capitals
• home to a number of European Institutions

A multicultural and trilingual country

• around 537,000 inhabitants
• great population diversity with 44.5% foreigners from about 170 countries
• official languages: Luxembourgish, French, German

An attractive employment market

• an international financial centre
• a modern economy with global industrial companies and international enterprises

A great offer of culture, leisure and sports

• a variety of theatre plays in different languages, music, cinema, museums, festivals, events
• numerous outdoor sports opportunities like mountain bike trails, hiking, rock climbing, sailing, water skiing, etc. as well as indoor facilities such as aquatic centres
• many cafes, bars, clubs, pubs and discos, mainly located in the Hollerich area, the old city centre and the Rives de Clausen

Luxembourg’s tourist charm

• a picturesque historic city – UNESCO World heritage site
• “Luxembourg’s Little Switzerland”
• the Ardennes castles
• the Moselle Valley
Contact

University of Luxembourg
Faculty of Science, Technology and Communication

Master of Science in Engineering – Sustainable Product Creation (académique)
6, rue Richard Coudenhove-Kalergi
L-1359 Luxembourg

Marielle Mabille (study secretary)
T. + 352 / 46 66 44-5906
marielle.mabille@uni.lu

Peter Plapper (course director)
T. + 352 / 46 66 44-5804
peter.plapper@uni.lu

For further information:
http://msp.uni.lu