




5.00 credits

30.0 h + 15.0 h

Q2

|                             |  |
|-----------------------------|--|
| Teacher(s)                  | Bekemans Marc ;  |
| Language :                  | English<br>> French-friendly   |
| Place of the course         | Louvain-la-Neuve   |
| Main themes                 | <ul style="list-style-type: none"> <li>• Theory of electrical circuits</li> <li>• Semiconductor physics</li> <li>• Automatic control</li> <li>• Thermal behaviour</li> <li>• Magnetics</li> </ul> <p>in the frame of energy conversion and motor control with power semiconductor switches</p>   |
| Learning outcomes           | <p><b>At the end of this learning unit, the student is able to :</b></p> <p>In consideration of the reference table AA of the program "master in electrical engineering ", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning:</p> <ul style="list-style-type: none"> <li>• AA1.1, AA1.2, AA1.3</li> <li>• AA2.1, AA2.3, AA2.5</li> <li>• AA3.2, AA3.3</li> <li>• AA5.4, AA5.5</li> </ul> <p>More precisely at the end of the course students will be able to</p> <p>1</p> <ul style="list-style-type: none"> <li>• determine the electrical quantities inside a converter and at its terminals for DC-DC converters, inverters and rectifiers</li> <li>• evaluate the electrical and thermal stresses of active and passive components in power electronic converters</li> <li>• build and make use of the small signal model of a converter (in particular of a DC-DC converter)</li> <li>• size the main components of a converter on the basis of specifications</li> </ul> <p>and</p> <ul style="list-style-type: none"> <li>• use an Excel file for sizing a converter</li> <li>• use a power electronic converter as a control device</li> </ul> |
| Evaluation methods          | <p>Assesment of the practical work on the basis of reports issued by groups of 3 to 4 students (simulation and sizing of converters), (25 % of the final note),</p> <p>Written assesment without documentation (75 % of the final note) with a duration of 3 hours</p>   |
| Teaching methods            | <ul style="list-style-type: none"> <li>- lectures</li> <li>- tutored solving in groups of problems (simulation and sizing of converters) posted on iCampus</li> <li>- use of softwares (Simulink, Pspice, Excel')</li> </ul>   |
| Inline resources            | <p>Moodle</p> <p><a href="http://moodleucl.uclouvain.be/course/view.php?id=8136">http://moodleucl.uclouvain.be/course/view.php?id=8136</a></p>   |
| Bibliography                | <p>Références :</p> <ul style="list-style-type: none"> <li>- Fundamentals of Power Electronics, Robert W. Erickson ISBN 0-412-08541-0</li> <li>- Electronique de Puissance 10ème édition, G. Séguier, F. Labrique, Ph. Delarue, ISBN 978-2-10-073866-3</li> <li>- Composants à semi-conducteur pour l'électronique de puissance, S. Lefevre, F. Miserez, ISBN 2-7430-0719-2</li> <li>- Transparents sur Moodle</li> </ul>  |
| Faculty or entity in charge | ELEC   |

**Programmes containing this learning unit (UE)**

| Program title                                  | Acronym                | Credits | Prerequisite | Learning outcomes   |
|--|------------------------|---------|--------------|---|
| Master [120] in Electrical Engineering         | <a href="#">ELEC2M</a> | 5       |              |  |
| Master [120] in Electro-mechanical Engineering | <a href="#">ELME2M</a> | 5       |              |  |
| Master [120] in Energy Engineering             | <a href="#">NRGY2M</a> | 5       |              |  |