

## APPLICATION

You can apply online on the Homepage of the Trainings- & Weiterbildungszentrum Wolfenbüttel e.V.

[www.tww.de](http://www.tww.de)

Or apply directly:

[www.batterietechnik.de](http://www.batterietechnik.de)

On this website you can apply by simply entering all of the required information. You will also have the option to specify another billing address in case your employer is paying for this course. After a successful application you immediately receive a confirmation email.

### Kosten

Battery technology I two-day seminar 850,-€\*  
Battery technology II – laboratory two-day seminar 850,- €\*  
Battery technology III – simulation two-day seminar 850,- €\*

The course fee includes the expenses for the seminar documents, lunch and the conference drinks.

\*Benefit for end consumers and companies exempt from VAT: The seminar is exempt from VAT ( § 4 Nr. 21 a) bb)).

### Venue

The events take place at the location of the Ostfalia University of Applied Sciences in Wolfsburg or the TWW e.V. in Wolfenbüttel.

**Trainings- & Weiterbildungszentrum Wolfenbüttel e.V.**  
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**Open up new perspectives**

## CERTIFICATE on Master Level

Battery technology and the development of Li-ion batteries in particular are more important than ever before. The development is being sustained by the increasing demand for vehicles with electric or hybrid powertrains. However, meeting the special operation conditions for mobility remains a challenge for the development of battery technology.

### Target group and requirements

The education modules are targeted especially at all engineers with a university degree specializing in electrical engineering, automotive engineering or mechanical engineering. Interested parties from other professional fields will receive a confirmation of participation.

### Academic level

The seminars for battery technology are conducted based on the latest quality standards QWeMob for university-equivalent professional education on master level. After successful participation in a knowledge test, the earned accomplishments may therefore be recognized by universities.



**Don't stay behind**

## BATTERY TECHNOLOGY II state of the art from the lab

Deepen your knowledge and discover the potential as well as the limits of battery technology for electric and hybrid vehicles through practical experience. You will measure modern Lithium-ion cells at different temperatures, C-rates and SOC using energy and impedance spectroscopy. In our well-equipped laboratories, you will dismantle Li-ion cells and subsequently analyze them gravimetrically and optically with a laserscanner microscope. To evaluate the security of different cells we conduct and evaluate Nail Penetration tests.

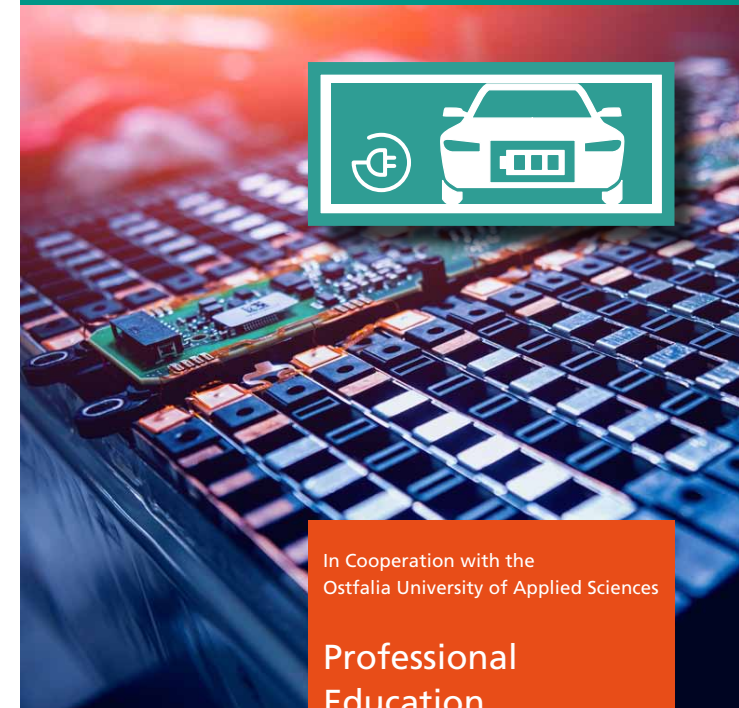


**Fit for the future**

**TWW**  
TRAININGS- & WEITERBILDUNGSZENTRUM  
Wolfenbüttel e.V.

## EDUCATION

### BATTERY TECHNOLOGY



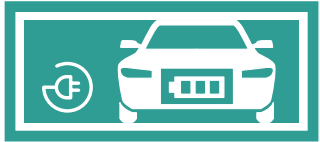
In Cooperation with the  
Ostfalia University of Applied Sciences

**Professional  
Education**

**At academic level in 3  
modules**

**Current dates on  
[www.batterietechnik.de](http://www.batterietechnik.de)**





## Professional Education at academic level in 3 modules

Current dates on [www.batterietechnik.de](http://www.batterietechnik.de)

### BATTERY TECHNOLOGY I

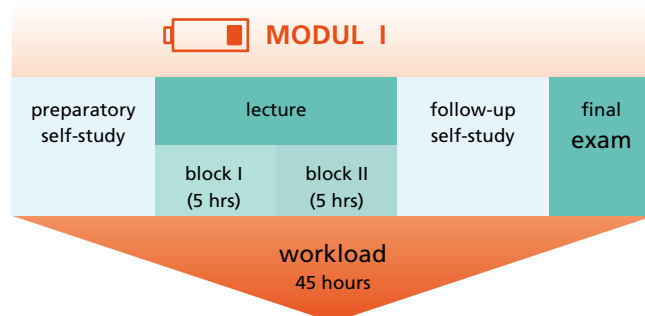
This two-day event covers the following topics: Principles of electrochemistry, structure and function of Lithium-ion batteries, properties of Lithium-ion batteries, material costs and availability, manufacturing of Lithium-ion cells, development and assembly of Li-ion battery systems, cell balancing, active and passive safety, BMS and thermal management.

#### Goals

Upon successful graduation, the participants are capable of:

- Understanding and describing the basics of electrochemistry and basic operation of modern batteries and battery systems.
- Understanding and classifying different types of batteries.
- Designing Li-ion battery systems and developing strategies cell balancing and thermal management.

#### Module structure



### BATTERY TECHNOLOGY II – LAB

Deepening the theoretical knowledge through several experiments, as part of the laboratory. A research cell will be set up and its efficiency and characteristics will subsequently be evaluated. Li-ion batteries with different cell chemistries will be measured using impedance spectroscopy, and the influence of temperature and C-rate on charge and discharge processes will be measured. A Li-ion cell will be dismantled and analyzed optically and gravimetrically.

#### Goals

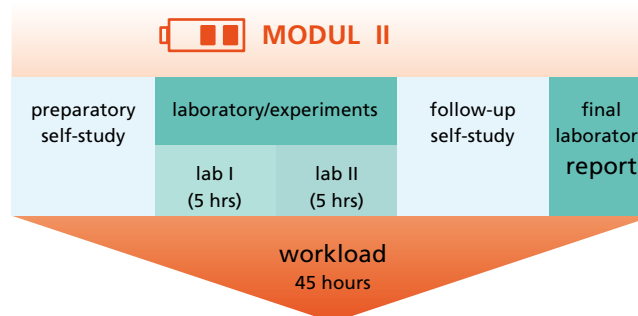
After the seminar the participants are capable of:

- Conducting measurements and practical work on batteries.
- Interpreting and evaluating the measurement results of Li-ion cells.

#### Extended requirements

This course requires participation in the module "Battery technology I" or comparable prior knowledge.

#### Module structure



### BATTERY TECHNOLOGY III – SIMULATION

This seminar covers the simulation of a Li-ion battery on the basis of experimental results, the thermal modeling of a Li-ion battery and the simulation of a battery module as well as the application of a battery management system by means of Matlab-Simulink.

#### Goals

Upon successful graduation, the participants are capable of:

- Developing simulation models of modern batteries and battery systems.
- Planning and setting up a battery management system.
- Evaluating different battery types according to the results of the simulation with various environmental parameters.

#### Extended requirements

This course requires participation in the educational module "Battery technology I" or comparable prior knowledge.

#### Module structure

