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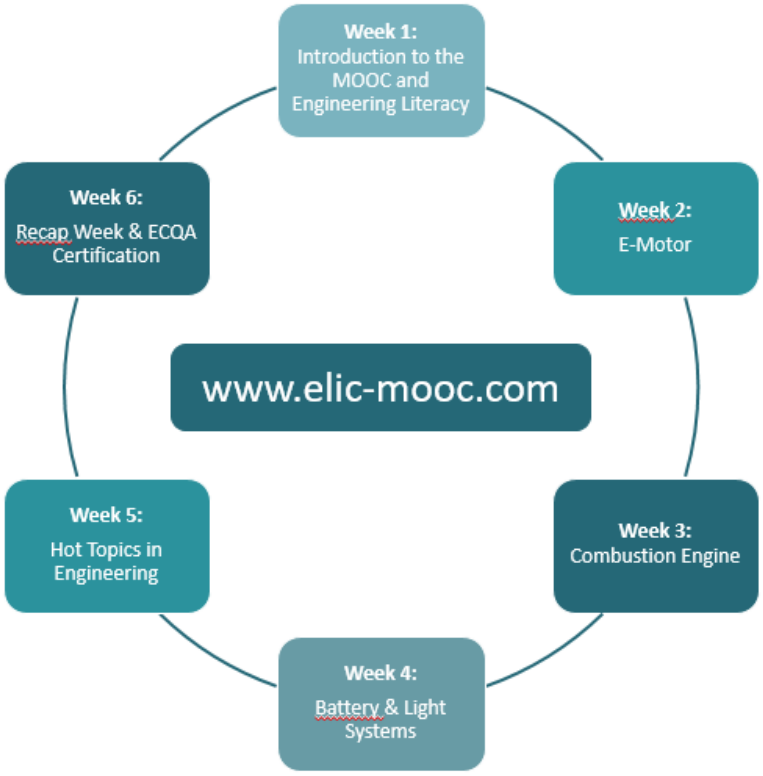
# ELIC MOOC OVERVIEW

## www.elic-mooc.com

**WHAT TO LEARN**

The Engineering Literacy (ELIC) MOOC is an open educational resource (OER) aimed at secondary school teachers of science, technology, engineering and mathematics (STEM) subjects. This MOOC provides a didactical and content toolbox for teachers which should help them to develop an engineering mindset amongst pupils aged 15-18 and increase their interest in engineering professions. Examples and experiments taken from automotive engineering are linked to content from different STEM subjects to show how knowledge of natural and technical sciences can be applied to real-world engineering problems.

This course consists of 6 modules and will run over a 6-week period. Each week, the facilitators will provide learning materials and tasks (e-tivities). The moderators or conveners will monitor the online learning process and actively support learners.



## Week 1: Introduction to the MOOC and Engineering Literacy

**Facilitator:** Daniel Spizzo & Adrian Millward-Sadler

**Moderator:** Erika Pernold, Sara Danelon & Hanna Sprenger

**Time period: 3rd until the 9th of February 2019**

**Description:** The first module aims at giving a general introduction to MOOC methodology, structure and requirements to get used to this online learning space and to understand how the ELIC MOOC is structured. This includes for example an overview of contents as well as the amount of time required to complete the course.

The participants thus will get an insight into the MOOC itself, the people involved in it and the topics that will be covered in each of the following weeks. Once familiar with this online learning space, participants will be asked to introduce themselves as a way of getting to know each other.

A general look at the concept of engineering literacy will be taken, in order to start some reflections on how to promote it through innovative training methods as well as to practice how to work on e-tivities which are going to be implemented throughout the whole course.

**Learning objectives:** By the end of this week you will

- understand the aims and objectives of a MOOC
- get to know facilitators, fellow participants and plan personal participation
- gain an insight into engineering literacy by means of a short introduction
- understand how to use ELIC MOOC for official final skills' certification

## Week 2: E-Motor – the future of the automotive industry?

**Facilitator:** Richard Messnarz

**Moderator:** Erika Pernold & Hanna Sprenger

**Time period: 24th of February until 2nd of March 2019**

**Description:** The goal of week four is to introduce the MOOC participants to electric motors in general and to show how electric motors are used in cars. This week will in depth deal with system componenents, system elements and interfaces in powertrain solutions in cars where e-motor concepts are used. Moreover, this week will create a system engineering understanding which allows participants to implement content related experiments at school to specific automotive functionalities.

**Learning objectives:** By the end of this week you will

- understand the system engineering concept of e-motor in cars
- know how STEM subjects can be linked to the concept of the e-motor in cars through innovative teaching methods and experiments

## Week 3: Combustion Engine at a Glance

**Facilitator:** Herbert Fellner & Wolfgang Kriegler

**Moderator:** Erika Pernold & Hanna Sprenger

**Time period: 17th until the 23rd of February 2019**

**Description:** The aim of this week is to give an introduction to the operation of internal combustion engines and to the impact on society and environment. The working process of the internal combustion engine is divided into 5 topics.

In "engine-mechanics" the basic function of a 4-stroke-engine will be described and the main parts are introduced.

In "fuels for engines" different possibilities of current and advanced fuels will be discussed, also discussed from various subject perspectives.

"Mixture formation and combustion" will highlight the transformation of chemical energy to mechanical energy and the last two topics will deal with emission, the reduction in after treatment systems and the impact of exhaust gas immission.

**Learning objectives:** By the end of this week you will

- understand the basic functions of internal combustion engines
- have an overview of the different current and advanced fuels for internal combustion engines
- have information on exhaust gases and why they occur and on how exhaust gases impact the society and the environment
- know how exhaust gases can be reduced

## Week 4: Battery & Light Systems

**Facilitator:** Jakub Stolfa, Daniel Kouril & Thomas Harach

**Moderator:** Erika Pernold & Hanna Sprenger

**Time period: 10th until the 16th of February 2019**

**Description:** The main aim of the second week is to introduce the MOOC participants to how headlamps and rear lamps are used in cars and to provide a system engineering understanding which allows teachers to assign experiments at school. Further, content related to specific automotive functionalities in the area of light systems will be explained and discussed during this week.

Another goal of this week is to introduce the participants to battery systems in general and how they are implemented into modern vehicles. The content provided within this week should give an overall understanding and show how various sciences such as physics etc. can be applied to modern vehicle battery systems.

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**Learning objectives:** By the end of this week you will

- understand the system engineering concept of the Lithium Ion battery system in cars
- knowing how STEM subjects can be linked to the battery system in cars through innovative teaching methods and experiments
- understand the system engineering concept of light systems in cars
- knowing how STEM subjects can be linked to the light system in cars through innovative teaching methods and experiments

## Week 5: Hot topics in Engineering – What is new and challenging for the industry?

**Facilitator:** Tim Ahrens

**Moderator:** Erika Pernold & Hanna Sprenger

**Time period: 3rd until the 9th of March 2019**

**Description:** During this week which is going to focus on "Hot Topics in Engineering" current issues in engineering will be discussed which include energy management, autonomous driving and cyber security in engineering. The topics are currently crucial for the automotive industry and it will be shown to the participants how they can be introduced to the set teaching curriculum in diverse STEM subjects with innovative teaching methods and tools.

**Learning objectives:** By the end of this week you will

- know, understand and be able to teach the basics of energy management to secondary school pupils
- know, understand and be able to teach the basics of autonomous driving to secondary school pupils
- know, understand and be able to teach the basics of cyber security to secondary school pupils
- understand the basic functionalities behind the technologies and forge your own opinion regarding these topics

## Week 6: Recap and certification – was it worth participating in the ELIC MOOC?

**Facilitator:** Annette Casey & Daniel Spizzo

**Moderator:** Erika Pernold & Sara Danelon

**Time period: 10th until the 16th of March 2019**

**Description:** During this week the participants will recap and summarize the highlight topics that have been discussed during the last five weeks. It is important that all participants reflect on their learning experiences from their MOOC participation for their own development but also it will be most important to give feedback on different didactical approaches connected to the individual subjects treated by the ELIC MOOC to the team of facilitators of the "Engineering Literacy" MOOC for further development.

Further, one main aim is also that the ELIC MOOC participants take the ECQA certificate to prove their newly acquired skills in the area of engineering literacy for secondary schools.

**Learning objectives:** By the end of this week you will

- have a detailed overview of the most important aspects of Engineering Literacy of the ELIC MOOC
- be able to select the most relevant content in order to boost engineering literacy among your pupils in your subject
- have a good understanding of how a MOOC can be implemented as a tool for teaching in your school
- have received the ECQA certificate, if desired by you

**HOW TO LEARN**

With this MOOC we, the ELIC team, aim to support learning processes in a diverse, international online group. Our experts/facilitators for the six weeks will provide different types of materials, questions for discussion and tasks to fulfill (e-tivities) with respect to the topics of the week. The moderators/conveners will support you to become an active online learner who collaborates with others to complete the tasks and who shares his or her learning experiences on the web.

Our philosophy

… is based on the principles of connectivism:

- Autonomy to make your own choices and be in control of your learning, to learn what is important for you and in which extent,
- Diversity with respect to your experience, your interests and where you are coming from – as well as the diverse experiences and interests of the experts, diverse resources (of learners and experts),
- Interactivity to give you the opportunity to engage with different learners from the participating countries
- and openness to everybody who is interested into our MOOC and open to share. In this MOOC you don’t need a password to contribute.

Support

The moderators/conveners will support you – see their suggestions:

- If possible, proceed as the MOOC proceeds and be active when the others are active (it’s easier this way),
- Don’t aim to read or watch everything, fulfill each task but choose what is of interest to you,
- Try to communicate online with the other learners and don’t be afraid of writing in English, nobody’s English is perfect.

**TIMELINE**

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| **Week 1**<br>Sunday, 3rd of February until Saturday, 9th of February 2019<br><br>Introduction to the MOOC and Engineering Literacy | **Week 2**<br>Sunday, 10th of February until Saturday, 16th of February 2019<br><br>E-Motor | **Week 3**<br>Sunday, 17th of February until Saturday, 23rd of February 2018<br><br>Combustion Engine at a Glance |
| Week 4<br>Sunday, 24th of February until Saturday, 2nd of March 2019<br>Battery & Light Systems | Week 5<br>Sunday, 3rd of March until 9th of March 2019<br>Hot topics in Engineering – What is new and challenging for the industry? | Week 6<br>Sunday, 10th of March until the 16th of March 2019<br>Recap and certification – was it worth participating in the ELIC MOOC? |