

# DOC, HHS, LiS, TNO, TUD

The Dutch Lifelong Optics Learning initiative aims to provide an optics and photonics training platform for professionals. A practical, testable and modular curriculum is being designed that can be widely used for all SME companies within the optics/photonics domain. Along with the courses available at the various participating educational institutes, which range from secondary vocational training to academic level, dedicated training modules will be developed to meet industrial needs, as determined from a survey that is currently being conducted among interested companies. This autumn, four companies that allow their employees to follow courses will participate in a pilot programme. Next year, the platform will be open to the general industrial public.



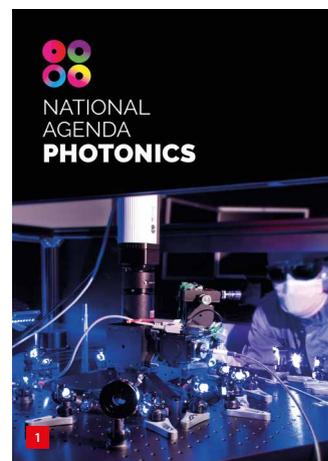
Last year, the Dutch Optics Centre (DOC), a joint venture between applied research organisation TNO and Delft University of Technology (TUD), launched the Lifelong Optics Learning initiative. They were joined by HHS (The Hague University of Applied Sciences, *De Haagse Hogeschool*) and LiS (*Leidse instrumentmakers School*). The project is subsidised by the Dutch Ministry of Social Affairs, under the SLIM incentive scheme for learning and development in SMEs.

The aim is to set up an optics and photonics training platform for professionals, and design a practical, testable and modular curriculum that covers optical training at different levels for professionals from Dutch industry.

## Rationale

High-end optics is closely related to photonics, the key enabling technology that uses the properties of light for a wide range of applications such as sensing, data communication and production technology. It comprises ten optical technologies: optical sensors, optomechanics, quantum optics, imaging, integrated photonics, glass fibres, optical materials, light sources (lasers, LEDs), detector technology, and photovoltaics (for solar energy).

In 2018, the Dutch government and the photonics ecosystem jointly drew up the National Agenda Photonics. Their objective was to intensify and accelerate the application of photonics technologies to solve societal challenges and create new businesses. One of the overarching aims is to strengthen photonics education (at vocational and academic levels) and align it with market needs, in order to resolve the scarcity of skilled staff and



The Lifelong Optics Learning initiative fits in with the aim of the National Agenda Photonics to strengthen photonics education.

improve knowledge transfer and application. This is where the Lifelong Optics Learning initiative fits in (Figure 1).

## Pilot and survey

The Lifelong Optics Learning curriculum will include modules (lectures and training courses with self-study) at the secondary and higher vocational education and the academic level, practicals, and an assignment based on a case from the participant's own company. A team of experts will test the acquired knowledge and skills. Currently, the curriculum is under construction, building on the available modules from the participating educational institutes. This will lay the foundation for a pilot programme starting this autumn with the four companies that support the project; Admesy, DJM, Hyperion and Optics11.

In parallel, a survey on the optical training needs in the high-tech industry will be conducted, in companies (primarily SMEs) operating in the optomechanics, optics and photonics domain. Finally, the mature Lifelong Optics Learning platform will be open next year for all interested parties.

## EDITORIAL NOTE

Input by Tijn van Heerden (TUD), Mariët Broxterman (LiS, TNO), Arjan Lock (HHS), Frank Molster (LiS), Bart Snijders (DOC, TNO) and Paul Urbach (TUD) is acknowledged.



At the LiS, Lifelong Optics Learning students can be trained in optics manufacturing. (Photo: Monique Hassink)

## Educational partners

### *Delft University of Technology*

TUD offers a mix of optics/photonics courses at bachelor/master level, both theoretical and experimental. Topics range from optical design, light-source theory and (hyperspectral) imaging methods to super-resolution, laser-spot optimisation, nano-optics and optical detectors. TUD also has developed new optical practicals at bachelor and master levels, and provides training in LabView and 3D printing. In addition, TNO can provide a course on creating free-form optics.

Two years ago, the closely related Optomechanical system design course was developed by TUD and partners. The course targets mechanical, mechatronic and optical engineers, offering a broad overview of this multidiscipline and helping engineers from the various disciplines to develop a common optomechanical language. The teachers

are experienced system architects and designers from TUD, TNO, AC Optomechanix and SRON.

### *The Hague University of Applied Sciences*

HHS is the only university of applied sciences in the Netherlands that offers a broad photonics educational specialisation track to (applied physics) students. After a general introduction in geometrical and physical optics, different modules cover specific sub-areas of photonics, including interferometry, fibre optics, spectroscopy, laser physics and optoelectronics. The courses are combined with practicals that make use of advanced facilities at HHS and partners.

In addition, there are general modules on image processing and digital signal processing. HHS also offers a project-based learning module in which students conduct applied photonics research and/or work on problems from companies.

## Apply for an assessment

As part of the survey that is currently being conducted, interested companies can apply for an assessment of their need for optical training. A potential outcome of this would be tailor-made modules or curricula that match the optical technologies applied and the corresponding knowledge and skills base required by the company concerned.

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As of this year, the focus on photonics has been further strengthened by the establishment of the research group (*lectoraat*) Photonics. Applied photonics research will be focused on high-tech industry, agri & food, energy & climate, health, and mobility. In all of these areas, digital technology plays a large role, with photonics contributing to digital data acquisition. Central topics of the research are spectroscopy, (fibre-based) metrology and imaging.

### *Leidse instrumentmakers School*

LiS is the only Dutch educational institution that offers training in making optical components. Its contribution to Lifelong Optics Learning is provided by the LiS Academy

and covers combined theory/practice lessons in order to develop knowledge and skills in an integrated manner. The offer starts with a number of basic optics lessons. Subsequently, theoretical topics include laser safety, fibre optics, understanding optical design and aberrations, and qualifying optical components.

The aim is to qualify students for the assembly of optical instruments and to provide them with enough background to engage in serious discussions with optical designers. The theory is supported by practicals, including the manufacturing or adaptation of optical components (Figure 2).

The LiS contribution is to a large extent based on the two elective modules that have recently been developed for its regular curriculum. These two modules are Optical Engineering and Optic Manufacturing. Lifelong Optics Learning students can follow the complete modules or select specific topics. A third elective module, Instrumentation for Space, also has optics-related content. This module aims to train students to specialise in the design and construction of instrumentation for satellites, rockets and astronomical observatories.

### Secondary benefits

The Lifelong Optics Learning platform will provide opportunities for knowledge transfer between educational and knowledge institutes mutually and with companies. This will yield valuable information for updating the regular curricula and generate leads for research projects, including graduation projects and internships, based on use cases presented by SMEs. Also, companies will gain easy access to advanced facilities such as production, coating and metrology equipment, cleanrooms, and other lab environments.

All in all, the Lifelong Optics Learning initiative will strengthen the Dutch optics/photonics ecosystem.

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## LIFELONG OPTICS LEARNING



Are you an  
SME entrepreneur?

And are you interested  
in participating in  
the pilot of  
Lifelong Optics Learning  
after reading the article?

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