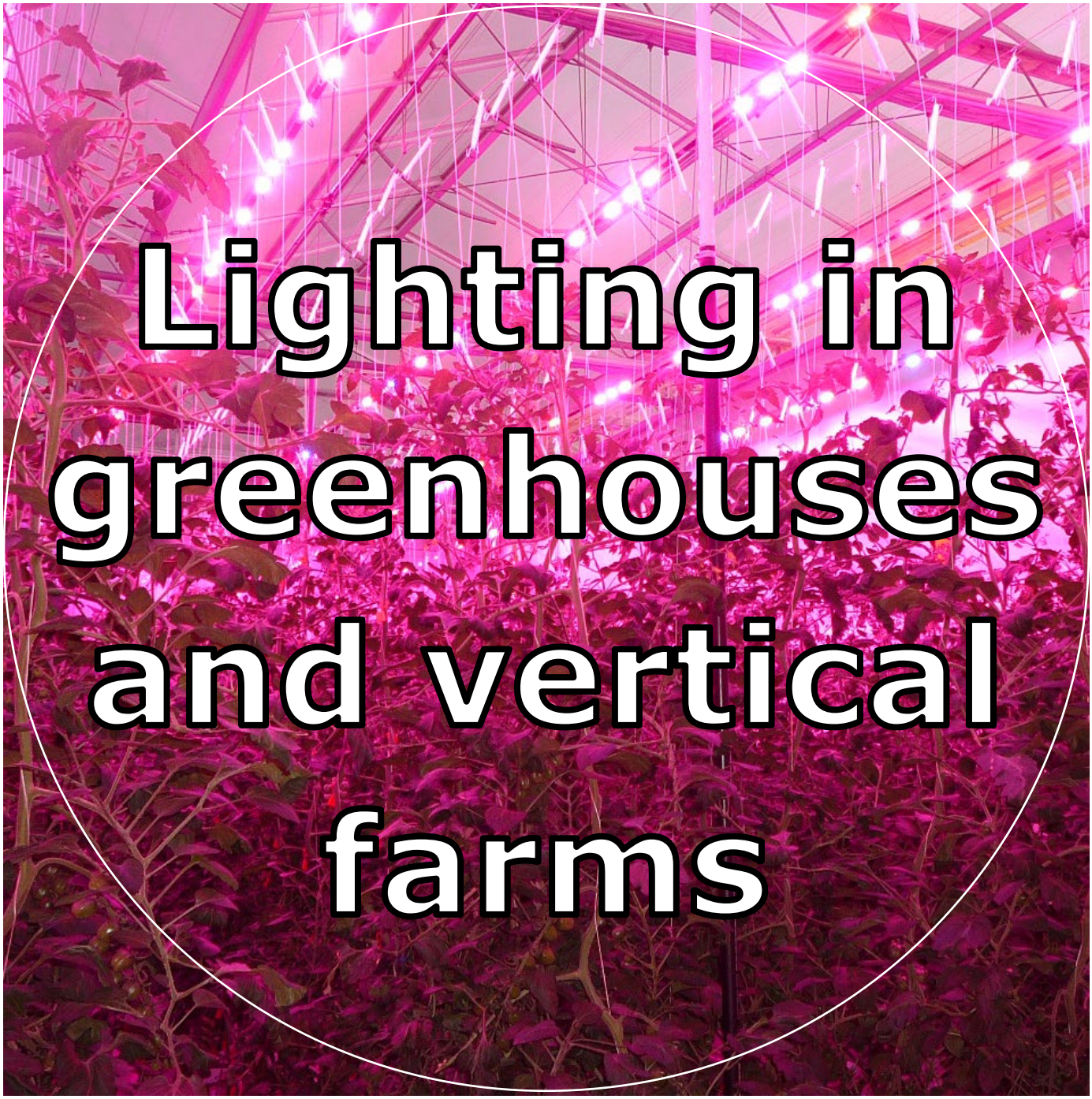

Lighting in greenhouses and vertical farms

Course: Lighting in greenhouses and vertical farms

12-14 February 2020

Wageningen, The Netherlands

WAGENINGEN
UNIVERSITY & RESEARCH

Do you want to improve the use of LED lighting in greenhouse production or vertical farming? Would you like to know how to reduce energy use and carbon foot print, how to improve production, or how to improve quality? Do you want to understand the different characteristics of light and how they affect physiological plant processes? Then this course might be valuable for you. Wageningen University and Research centre is the "knowledge heart" of the Dutch Greenhouse Horticulture, which is the most advanced and productive in the world. In this course on lighting in greenhouses and vertical farms Wageningen UR scientists will share their unique knowledge with international students, researchers, and horticultural and light experts. The course will be held in Wageningen, The Netherlands.

Course objectives

The aim of this course is to learn the basic principles behind the effects of LED lighting on plant growth, yield, product quality, and energy use efficiency.
It aims that participants also understand how to apply this information in their daily practice by developing strategies to optimize the use of lighting in relation to the whole production system.

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Learning outcomes
This course gives participants an in-depth view on:

- Perception of light by plants
- Major plant physiological and morphological processes affected by light
- how lighting can be used effectively in greenhouses and vertical farms
- The different characteristics of light and how to measure.

The course consists of a mixture of interactive classroom lectures, group discussions, demonstrations, and an excursion day.
The lectures will be given by a team of experts of Wageningen UR.

For whom?
This excellent and intensive course is meant for professionals in lighting, greenhouse production and vertical farms as well as MSc and PhD students, post-docs and junior scientists from all over the world.

Practical Information
Course fee: € 840 early bird until 25 November 2019, thereafter € 890 per person including hand-out material, coffee/tea, lunches, excursion and one dinner.
Dates: 12-14 February 2020
Registration until: 14 January 2020 (early bird until 25 November 2019)

More detailed information will be provided soon on our Outreach-courses page: https://www.wur.nl/en/Research-Results/Chair-groups/Plant-Sciences/Horticulture-and-Product-Physiology-group/Outreach-courses.htm

Registration: send registration form to Leo.Marcelis@wur.nl

Contact
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Venue of the course on 12 and 14 February

Forum, Droevendaalsesteeg 2, Wageningen
https://www.wur.nl/en/location/Forum-building-number-102.htm
Class room C0317 (third floor)

Programme

DAY 1: Wednesday 12 February
Location: Forum, Droevendaalsesteeg 2, Wageningen. Class room C0317 (third floor)

9.00 General introduction to light in horticulture *(Prof Leo Marcelis)*
- Key aspects of production in greenhouses and vertical farms and role of light

9.45 Vertical farming (*Prof Leo Marcelis*)
- Possibilities
- Bottle necks

10.30 Break

11.00 Measurement of light (*Prof Leo Marcelis*)
- What, where, and how to measure

12.30 Group photo
12.35 Lunch (in Grand Cafe, ground floor)

13.30 Climate control and energy (D*r Cecilia Stanghellini*)
- Light in relation to climate and vice versa
- Energy use efficiency

15.00 break

15.30 Light use efficiency of crops under LED Light (*Dr Ep Heuvelink*)
- How much can a plant produce per unit of light
- Analysis of components of plant yield

17.00 closure

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UNIVERSITY & RESEARCH

Programme

DAY 2: Thursday 13 February

Excursion

- Whole day excursion to modern companies growing plants in vertical farm and greenhouses with LED lighting

- **8.15 (sharp) departure from ' Hotel and congress centre Hof van Wageningen' Lawickse Allee 9**; http://www.hofvanwageningen.nl/)

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WAGENINGEN
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Programme

DAY 3: Friday 14 February
Location: Forum, Droevendaalsesteeg 2, Wageningen. Class room C0317 (third floor)

9.00 Physiology (*Prof Leo Marcelis*)
- Photosynthesis
- Photomorphogenesis
- Photoreceptors

10.30 Break

11.00 LED in (semi-)practice (*Dr Anja Dieleman*)
- Design of LED based greenhouse cultivation
- Experiences and lessons learned

12.30 Lunch (in Orion, restaurant De Spot)

13.30 Excursion (*Prof Leo Marcelis*)
- Visit and discuss latest experiments of Wageningen university on LED lighting

15.00 Break

15.30 Case studies from participants (*Prof Leo Marcelis*)
- Up to one week before the course participants can send in a question or a case study. Here we will discuss some selected case studies

16.15Control of product quality by light (*Prof Ernst Woltering*)
- Appearance of plant products
- Shelf life
- Taste
- Health promoting compounds (vitamin C, anthocyanins, etc.)

17.00 Ceremony with certificates and drinks & bites (in Grand Cafe, ground floor)

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Lecturers

Prof Leo Marcelis

Dr Cecilia Stanghellini

Dr Ep Heuvelink

Dr Anja Dieleman

Prof Ernst Woltering

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