

## IOC Training Course and Identification Qualification in Harmful Marine Microalgae, March-April 2025

Since 1993 the IOC has conducted training courses on harmful microalgae. The purpose has been to improve the taxonomic and identification skills of the participants for research purposes and for practical monitoring of harmful algal blooms.

From 2006 the IOC training in HAB identification has been offered within a new framework which gives accreditation. The present course includes now a practical exam at the end of the course with an **IOC Certificate of Proficiency in Identification of Harmful Algae** issued to participants who pass the exam. We know by experience that many of the more than 500 trainees we have had over the years have wished the courses to give accreditation, and in some countries, the IOC courses have become a reference for laboratories to be approved for carrying out regulatory monitoring for harmful microalgae.

The IOC Science and Communication Centre on Harmful Algae, University of Copenhagen, Denmark is organizing the course.

### IOC Training Course and Identification Qualification in Harmful Marine Microalgae 2025

**Course description:** The course includes 100 hours of teaching and is divided into two parts. 1) The first part of the course is an internet teaching programme on the Ocean Teacher platform giving general introductions to the various groups of harmful algae; this part is mainly for self-study and estimated to 40 hours of reading. 2) The second part is a practical course in species identification (see tentative programme below). Part 2 includes 60 hours of teaching and a microscope will be available to each participant during the entire period.

**Dates:** Part 1 will be available on the 'International Oceanographic Data Exchange' (IODE) teaching platform 'Ocean Teacher' from 2 months prior to the practical course; part 2, proposed dates for the practical course, 30 March – 10 April 2025.

**Venue:** IOC Science and Communication Centre on Harmful Algae, Department of Biology, University of Copenhagen, Denmark, c/o Danhostel, Lejrskolevej 4, 3400 Hillerød.

**Language:** English.

**Course lecturers:** Dr. Jacob Larsen, Dr. Nina Lundholm. Enquiries may be sent to Jacob Larsen, [jacobl@bio.ku.dk](mailto:jacobl@bio.ku.dk)

**Price:** The price of the course covers expenses as follows:

Full board and lodging, this a package-deal and includes

- Accommodation in single rooms including bed linen and towels, arriving to the course venue on Sunday 30 March 2025, check-in from 16.00, and check-out on Thursday 10 April 2025 at 10.00

- All meals during the course, starting with an evening meal on Sunday 30 March and finishing with breakfast on Thursday 10 April, ice water and refreshments during teaching hours

#### Teaching as described above and course material

- Access to the distant learning programme on Ocean Teacher which will be available two- months prior to the practical course
- Teaching material including hard copies or pdf-versions of the following books which will be distributed during the practical part of the course:
  - o Hoppenrath, M., Murray, S.A., Chomérat, N. & Horiguchi, T. 2014. Marine Benthic Dinoflagellates: Unveiling Their Worldwide Biodiversity. - Kleine Senckenberg-Reihe, Volume: 54, 1-276 (hard copy)
  - o Lassus, P., Chomérat, N., Hess, P. & Nézan, E. 2016. Toxic and Harmful Microalgae of the World Ocean. – Denmark. International Society for the Study of Harmful Algae / Intergovernmental Oceanographic Commission of Unesco. IOC Manuals and Guides 68, 523 pp. (hard copy)
  - o Karlson, B., Cusack, C. & Bresnan, E. (eds). 2010. Microscopic and molecular methods for quantitative phytoplankton analysis. – IOC Manuals and Guides 55, Paris, Unesco, 110 pp. (pdf-version)
  - o Larsen, J. & Nguyen, N.L. (eds). 2004. Potentially toxic microalgae of Vietnamese waters. – Opera Bot. 140: 5-216 (pdf-version)
  - o Reguera, B., Alonso, R., Moreira, A., Méndez, S., Dechraoui-Bottein, M.-Y. (eds). 2016. Guide for designing and implementing a plan to monitor toxin-producing microalgae. 2<sup>nd</sup> ed. – IOC Guides and Manuals 59, Intergovernmental Oceanographic Commission (IOC) of Unesco and International Atomic Energy Agency (IAEA), Paris and Vienna, 66 pp. (pdf-version)
- Copies of all lectures given during the course
- Use of facilities, microscopes, samples, and cultures
- Tuition during the practical part of the course

Tentative programme for the hands-on part of the course. All participants are urged to bring material/ samples for the training course.

## Part II, Tentative Course Programme, 30 March - 10 April 2025

	Morning 9-12	Afternoon 13.30-17.00
Sunday, 30 March	Arrival to the course venue, Danhostel, Lejrskolevej 4, 3400 Hillerød <a href="http://www.danhostel.dk/hostel/danhostel-hilleroed">http://www.danhostel.dk/hostel/danhostel-hilleroed</a>	
Monday, 31 March	Welcome address Lecture: Biology of harmful algae Introductions by the participants, 15 min.	Lecture and microscope demonstration: harmful raphidophytes
Tuesday, 1 April	Lecture and microscope demonstration: harmful haptophytes Lecture and microscope demonstration: Dictyochophytes	Introduction to dinoflagellates Lecture and microscope demonstration: planktonic species of <i>Prorocentrum</i>
Wednesday, 2 April	Lecture: Introduction to benthic dinoflagellates Lecture and microscope demonstration: benthic species of <i>Prorocentrum</i>	Lecture and microscope demonstration: <i>Dinophysis/Phalacroma</i>
Thursday, 3 April	Lecture and microscope demonstration: <i>Pyrodinium</i> and other gonyaulacales	Benthic dinoflagellates: <i>Gambierdiscus</i> , <i>Ostreopsis</i> , <i>Coolia</i>
Friday, 4 April	Lecture: Molecular methods and phylogenetic analysis Lecture and microscope demonstration: <i>Pseudo-nitzschia</i>	Lecture and microscope demonstration: <i>Pseudo-nitzschia</i> , continued Lecture and microscope demonstration: <i>Peridinales</i>
Saturday, 5 April	Free	
Sunday, 6 April	Free	Lecture and microscope demonstration: unarmoured dinoflagellates
Monday, 7 April	Lecture and microscope demonstration: <i>Alexandrium</i>	Lecture and microscope demonstration: <i>Alexandrium</i> , continued, mixed samples
Tuesday, 8 April	Mixed samples – own samples	Mixed samples – own samples
Wednesday, 9 April	Exam	General discussion, evaluation
Thursday, 10 April	Check-out after breakfast at 10 am	

HAB species to be demonstrated during the course (\*cultures, subject to availability).

**Haptophyceae\***: *Chrysochromulina* spp. *Prymnesium parvum*.

**Raphidophyceae\***: *Chattonella antiqua*, *C. ovata*, *C. subsalsa*, *Fibrocapsa japonica*, *Heterosigma akashiwo*, *Olisthodiscus luteus* (Olisthodiscophyceae).

**Dictyochophyceae\***: *Pseudo-chattonella verruculosa*

**Dinophyceae:** *Prorocentrum concavum*, *P. cordatum*, *P. emarginatum*, *P. gracile*, *P. obtusidens*, *P. hoffmannianum*, *P. lima*, *P. micans*, *P. rhathymum*, *P. rostratum*, *P. scutellum*, *P. triestenum*

*Dinophysis acuta*, *D. acuminata*, *D. caudata*, *D. fortii*, *D. miles*, *Phalacroma mitra*, *D. norvegica*, *P. rotundatum*, *D. tripos*

*Alexandrium affine*, *A. minutum*\*, *A. catenella*, *A. ostenfeldii*, *A. pacificum*\*, *A. pseudogonyaulax*, *A. tamarense*, *A. margalefi*, *A. taylorii*

*Pyrodinium bahamense*, *Lingulodinium polyedrum*, *Protoceratium reticulatum*, *Gonyaulax polygramma*, *G. spinifera*, *Vulcanodinium rugosum*, *Gambierdiscus spp*, *Coolia spp.*, *Ostreopsis spp.*

*Akashiwo sanguinea*\*, *Amphidinium carterae*\*, *Margalefidinium polykrikoides*\*, *Gymnodinium catenatum*\*, *G. impudicum*\*, *Karenia mikimotoi*\*, *K. papilionaceae*\*, *K. selliformis*\*, *Karlodinium armiger*\*, *K. micrum*\*, *Noctiluca scintillans*.

**Bacillariophyceae:** *Pseudo-nitzschia australis*, *P. calliantha*\*, *P. delicatissima*, *P. fraudulenta*, *P. multiseriata*, *P. pungens*\*, *P. seriata*, *Nitzschia navis-varingica*.