



# CMAS

CONFÉDÉRATION MONDIALE  
DES ACTIVITÉS SUBAQUATIQUES

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WORLD UNDERWATER FEDERATION

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**SCIENTIFIC COMMITTEE**

**STANDARD**  
**Marine Biology**

**Version 2000/00**

Ces standards ont été réalisés par les membres du comité scientifique CMAS entre 1997 et 1999

Ces membres étaient :

**Président du Comité Scientifique et Vice Président CMAS**  
**Vice-Président du Comité et Président Archéologie**

**Secrétaire**

**Président Biologie**

**Président Géologie**

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Membre correspondant.

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pour la partie Océanologie

Traductions

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Anglais

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Standard Archéologie

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Mr. Christian Ide (texte Français).

Prof. Manuel Martin-Bueno

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Mr. Enrico Rampinelli

Dr Martine Moerman (Original en Français)

( Original en Français )

Standard Biologie marine et des eaux douce

Prof. Dr Willi Xylander

Standard Géologie

( Originiaux en Anglais ).

Prof. Dr Klaus Muller

( Original en Anglais )

Révision, unification et édition de l'ensemble des standards Dr Alain Norro

# MARINE BIOLOGY

## SCIENTIFIC SPECIALITY CERTIFICATE

Marine Biology 10 h  
Advanced Marine Biology 30 h including 15 h field work.

### 1. MARINE BIOLOGY

#### 1.1. Aim of course

- 1.1.1. to introduce divers to marine life and marine sciences
- 1.1.2. to increase awareness for marine life
- 1.1.3. to promote the idea of sustainable diving and to create multipliers for these ideas
- 1.1.4. to introduce important marine animal and plant taxa and their biology
- 1.1.5. to increase the everyday personal experience of divers for marine ecosystems on the background of better knowledge on the interrelationships of its parts

#### 1.2. Student performance objectives

By the end of the course the diver should

- 1.2.1. be familiar with basic biological and oceanological processes in the sea
- 1.2.2. know important animal and plant groups and be able to recognize them
- 1.2.3. dive sustainably due to his/her more comprehensive understanding of sea life

#### 1.3. Prerequisites minimum requirements

- 1.3.1. student's age: 14 years or older
- 1.3.2. CMAS \* or equivalent
- 1.3.3. sufficient buoyancy control (check dive if necessary)
- 1.3.4. current medical certificate

#### 1.4. Instructor/student ratios in open water (maximum)

- 1.4.1. excellent visibility 1/4
- 1.4.2. good visibility 1/2
- 1.4.3. poor visibility 1/1

#### 1.5. Instructor requirement

- 1.5.1. normally a scientific degree in biology or a related field (B.Sc., M.Sc., PhD, Dr.) (if a CMAS 3\* diver (minimum) is able to show his/her broad experience in the field of marine biology he/she may also be acknowledged as course instructor for the Marine Biology Speciality brevet)
- 1.5.2. at least CMAS\*\*\*-diver or equivalent or CMAS Scientific Diver Brevet
- 1.5.3. high sensibility for sustainable diving and nature preservation
- 1.5.4. very good knowledge of marine underwater biology and marine sciences
- 1.5.5. participation in a course run by an instructor authorized for the CMAS Marine Biology Speciality Brevet (e. g. federation representatives for underwater sciences)

#### 1.6. Speciality course requirements:

- 1.6.1. Course approval: see general procedure §
- 1.6.2. adequate lecture/class room
- 1.6.3. slides and/or transparencies, species identification pads or books
- 1.6.4. if possible: suitable safe diving site in moderate depth
- 1.6.5. CMAS Marine Biology Brevet text book (if already available)
- 1.6.6. teaching material on sustainable diving (e. g. video Coral Reefs - Diving and Conservation)

#### 1.7. Course overview structure

- 1.7.1. minimum duration of classroom hours: 10
- 1.7.2. open water dives (if possible): about 4
- 1.7.3. in special cases this type of course may be held and certified without dives (e. g. inland course in co-operation with a seawater aquarium) -
- 1.7.4. recommended maximum number of students: 20

## 1.8. Minimum course content

### 1.8.1. *General information on the sea and its organisms*

1. The sea - an introduction (incl. e. g. size, depth, currents, chemistry)
2. Plankton, nekton, benthos - life cycles of marine organisms
3. Coral reefs - Distribution and zonation
4. mechanisms of nutrient access (e. g. symbiosis, filtration, sediment feeding, predators)
5. symbiosis, parasitism, commensalism
6. use of the sea (fishing, mining, sewage discast etc.)
7. nutrient cycle, nutrient pyramid (production, consumption as processes)
8. biotope-biocoenosis / interrelationships and dependence of the living and non-living

### 1.8.2. *Sustainable diving*

### 1.8.3. *Organismic biology*

1. algae and protozoa
2. sponges and cnidarians
3. molluscs (shells, snails and cuttlefish)
4. crustaceans
5. echinoderms
6. fishes
7. other marine vertebrates (e. g. turtles, whales, dolphin, penguins)

## 1.9. Certification

1.9.1. the brevet is valid permanently

1.9.2. all divers having successfully completed all components of the course will be issued with the appropriate CMAS Marine Biology Speciality diploma and brevet card

1.9.3. all instructors having successfully completed all components of the requirements listed in Instructor **requirement will be issued with the appropriate CMAS Marine Biology Speciality**

## **2. MARINE BIOLOGY - ADVANCED LEVEL-**

### **2.1. Aim of course**

- 2.1.1. to give the diver a personal experience of marine sciences
- 2.1.2. to make the diver familiar with marine animal and plant taxa and their ecology
- 2.1.3. to obtain qualified multipliers for the ideas of protection of marine life and sustainable diving
- 2.1.4. to teach simple methods of marine sciences which can be used by sports divers
- 2.1.5. to provide a microscopic approach to important animal and plant taxa
- 2.1.6. to increase the access to the "tiny life" in the sea
- 2.1.7. to enable the diver to have access to the sea as ecosystem

### **2.2. Student performance objectives:**

- by the end of the course the diver should
  - 2.2.1. be familiar with the general biological and oceanological processes in the sea
  - 2.2.2. know animal and plant groups and their biology and interrelationships
  - 2.2.3. have written a short "thesis" on a scientific item he/she had practically worked on

### **2.3. Prerequisites minimum requirements**

- 2.3.1. student's age: 16 years
- 2.3.2. CMAS \*\* or equivalent
- 2.3.3. sufficient buoyancy control (check dive if necessary)
- 2.3.4. current medical certificate

### **2.4. Instructor/student ratios in open water (maximum)**

- 2.4.1. excellent visibility: 1:2
- 2.4.2. good visibility: 1:2
- 2.4.3. poor visibility: 1:1

### **2.5. Instructor requirement**

Same as in the "Marine Biology course"

### **2.6. Speciality course requirements:**

- 2.6.1. Course approval: see general procedure §
- 2.6.2. adequate lecture/class room
- 2.6.3. slides and/or transparencies, species identification pads or books
- 2.6.4. suitable safe diving site in moderate depth
- 2.6.5. equipment for scientific sampling and investigations (e. g. microscopes, dissecting microscopes, equipment for plankton sampling)
- 2.6.6. Scientific and determination literature
- 2.6.7. teaching material on sustainable diving (e. g. video "Coral reefs - Diving and Conservation")

### **2.7. Course overview structure**

- 2.7.1. minimum duration: classroom hours: 14 h
- 2.7.2. work in the laboratory: at least 5 days a 3 hours: 15 h
- 2.7.3. open water dives: at least 5
- 2.7.4. Project: the students/divers should make an own "scientific project" which is initiated and supervised by the course instructor.
- 2.7.5. recommended maximum number of students: 15

### **2.8. Minimum course content**

- 2.8.1. *General information on the sea and its organisms (lectures)*
  1. the sea - an introduction (incl. e. g. size, depth, currents, chemistry)
  2. plankton, nekton, benthos - life cycles of marine organisms
  3. biogeography of marine life and ecology
  4. mechanisms of nutrient access (e. g. symbiosis, filtration, sediment feeding, predation)
  5. symbiosis, parasitism, commensalism
  6. use of the sea (fishing, mining, sewage discast etc.)
  7. nutrient cycle, nutrient pyramid (production, consumption as processes)
  8. biotope-biocoenosis / interrelationships and dependence of the living and non-living

2.8.2. *Projects (outdoor/underwater work; examples)*

1. parasites (of fishes, snails and other easily accessible animals)
2. depth distribution of animals or plants (specify the group!)
3. settlement pattern of benthic organisms
4. predator-prey interrelationships
5. bioindication of marine organisms

2.8.3. *Laboratory work (examples)*

1. plancton (different depth)
2. echinoderms
3. epizoon
4. sponges and cnidarians
5. crustaceans
6. tunicates
7. fishes

2.8.4. *Organismic biology (lectures)*

1. algae and protozoa
2. sponges and cnidarians
3. worms
4. molluscs (shells, snails and cuttlefish)
5. crustaceans
6. echinoderms
7. tunicates
8. fishes
9. marine mammals

**2.9. Certification**

2.9.1. the brevet is valid permanently

2.9.2. all divers having successfully completed all components of the course will be issued with the appropriate CMAS Marine Biology – Advanced level -Speciality diploma and brevet card