THE BRITISH SUB AQUA CLUB

TECHNICAL SKILL DEVELOPMENT COURSE SYLLABUS

ADVANCED MIXED GAS DIVER

AIM

To qualify as a BSAC Advanced Mixed Gas Diver who is competent to:

- Conduct dives with an open circuit buddy, within the restrictions of the lesser, in conditions already encountered by either during their training or previous experience.
- Conduct dives within BSAC Safe Diving guidelines.
- Conduct dives with an appropriately qualified diver to expand their experience, within the limits of their mixed gas certification, beyond that previously encountered.
- Conduct dives breathing any suitable combination of gas mixtures.
- Dive to a maximum depth limit of 80 metres.
- Plan and conduct dives requiring mandatory decompression
- Rescue another mixed gas diver from depth.
- Conduct dives where other divers, capable of providing assistance and rescue management skills, are available at the surface.

Course Outline

The advanced mixed gas diver course consists of the following elements:

- Six classroom lessons
- A theory assessment
- A dry practical lesson of two hours
- One or more sheltered water lessons of not less than 120 minutes total in-water duration
- Five open water lessons, dependant on student performance, with a total underwater duration of not less than 300 minutes and an individual lesson duration of not less than 45 minutes.

  All practical training in both sheltered and open water includes the achievement of specific performance standards at appropriate points throughout the lessons.

ENTRY REQUIREMENTS

In order to attend this course, students must comply with the following:

- Be a minimum of 18 years of age
- Hold a minimum diver grade of BSAC Sports Diver (or equivalent with a valid 35 metre depth certification)
- Be able to demonstrate a high level of proficiency in diving. In general terms, this usually entails about 100 logged dives
- Be a BSAC Extended Range Diver or BSAC Sport Mixed Gas Diver and required to complete all core elements of the course syllabus or be a BSAC Explorer Mixed Gas Diver and at the instructor's discretion, as a minimum, complete the following course elements:

- Classroom lessons: Decompression Theory & Dive Planning
- Open Water Dive lessons: 3, 4 and 5.

Equipment Configuration

- Two primary cylinders, total capacity determined by the rule of thirds and personal RMV, suitable for diving to 80 metres
- Stage cylinders of minimum capacity seven litres.
- Access to an Alternate Supply (AS) demand valve, minimum hose length 1.5 metres
- Mask & fins
- Weight belt or integrated weights where necessary
- Two depth gauges and/or watch/timer and/or decompression computers
- Suitable mixed gas for the lessons
- A delayed surface marker buoy (preferably red) and reel
- An emergency (preferably yellow) delayed surface maker buoy and spare reel
- An additional surface detection aid (e.g. a folding flag)
- Spare mask
- Knife and line cutter
- Slate
- Tag marker for lazy shot/trapeze
- Two torches (primary & backup)
- Buoyancy - two independent rescue solutions
- Trim weights
- Protective clothing as appropriate.

INSTRUCTOR REQUIREMENTS

BSAC Advanced Mixed Gas Diver training is required to be carried out by, or supervised by, an approved BSAC Advanced Mixed Gas Instructor.

Dry practical lessons - To ensure that the student can fully participate in the exercises and receives effective tuition, the lesson contents assume a ratio of six students per instructor.

For practical lessons, student/instructor ratios should comply with the following guidelines:

Confined water lessons - The confined water lesson notes assume the most likely scenario of the lesson being carried out in open water, where time constraints are typically not imposed.

In order that all students can receive effective tuition during this time, a maximum ratio of four students per instructor is assumed.

In less favourable circumstances, this ratio may need to be reduced appropriate to the water conditions and time available.

Where water conditions allow longer lessons, the above ratios may be increased to a ratio of a maximum of six students per instructor provided that:

- All students can receive effective tuition within the time available
- Underwater visibility is a minimum of 5 metres
- The instructor is of a minimum grade of BSAC Advanced Mixed Gas Diver Instructor

- The instructor has the assistance of another diver, minimum qualification Dive Leader and Advanced Mixed Gas Diver or equivalent registered with BSAC, to monitor the safety and control of students. This safety diver may not teach unless he/she meets the requirements for a BSAC Assistant Advanced Mixed Gas Diver Instructor

- The lesson briefing includes clear directions as to the role of the assisting diver during skills instruction.

Open water lessons - Because of the nature of the exercises being taught, the lesson contents assume a ratio of two students for a single instructor or up to four students provided the instructor has the assistance of another diver, minimum qualification Dive Leader and Advanced Mixed Gas Diver or equivalent, to monitor the safety and control of students. This is to ensure that each student receives safe effective tuition.

FACILITIES

Suitable classroom with teaching aids for formal presentations. Suitable shallow water dive site (10 metres maximum) for skills development. Dive sites with 40 metres maximum for open water dives 1 and 2. Dive 3, with maximum depth to 55 metres. Dive 4, with a maximum depth to 65 metres and Dive 5, with a maximum depth to 75 metres.

QUALIFICATION

Course certification will be issued by BSAC HQ after the event.

LESSON SYLLABUS

Day 1

Instructor briefing

Course Introduction

- **Course outline**
- **Assessment**
- **BSAC Advanced Mixed Gas Diver**
- **Course implementation**
- **Course programme**

Theory Lesson 1 Introduction to Mixed Gas Diving

- **Mixed gas diver certification**
- **History and development**
- **What is mixed gas diving?**
- **Why dive mixed gases?**
- **Issues**

Theory Lesson 2 Equipment and decompression systems

- **Equipment rigging**
- **Diver configuration**
    - Cylinders
    - Gas analysis
    - Regulators
    - Buoyancy
    - Accessories
    - Dive computers
- **Decompression systems**
    - Lazy shot
    - Trapeze
    - Back-up stage cylinders
    - Drop cylinders

Dry Practical Lesson - Equipment Preparation

Open Water Lesson - Confined Water Skills

- **Pre-dive**
- **Briefing**
- **Kit configuration and kit up**

  - **Waterside checks**
  - **Buddy checks**
- **Descent phase**
  - Bubble and equipment check
  - Gas switch
  - Computer gas switch
- **Dive phase**
  - Travel to Dive gas Switch
  - Dive gas regulator switch.
  - Weighting, trim & buoyancy
  - Change to spare mask
  - Isolation and shut down procedures
  - Stage cylinder ditch and retrieve
  - Stage cylinder hand off
  - Out of gas response
- **Ascent phase**
  - Seabed DSMB deployment
  - Switch to travel gas
  - Switch to decompression gas
  - Simulated decompression stop
  - Out of travel or decompression gas response
- **Surface phase**
  - Hand up stages & exit

Post dive actions

Theory Lesson 3 Physiology

- **Narcosis**
- **Helium**
- **High Pressure Neurological Syndrome**
- **Carbon Dioxide Retention**
- **Fitness**
- **Oxygen**
- **Stress**

Day 2

Theory lesson 4 Decompression Theory

- **Background**
- **Bubble circle**
- **Bubble theory**
    - Haldanean concept
    - Dissolved gas model
    - Critical volume model
    - Arterial bubble model
    - Micro bubbles
    - Deep stops
- **Helium decompression**
- **General advice**

Theory lesson 5 Dive Planning

- **The qualification**
- **Gas selection**
- **Custom gas selection**
- **Gas selection - reserve**
- **Dive planning**
- **PC software - dive examples**
- **Gas management**
- **Run time management**
- **Decompression analysis**

Open water lesson Open Water Dive 1

- **Dive planning**
    - Decompression dive with maximum of 15 minutes ascent time
    - Prepare run time slate
- **Pre-dive**
    - Equipment preparation
    - Waterside checks
    - Briefing
    - Pre-dive checks
    - Kit configuration and kit up
    - Buddy checks
- **Descent phase**
    - Bubble check
    - Travel gas to dive gas switch

- **Dive phase**
    - Weighting, trim & Buoyancy
    - Gas switches
    - Shut down and Isolation procedure.
    - Gas monitoring and management
    - Run time management
- **Ascent**
    - Run time management
    - Dive gas to travel gas switch
    - Mid-water DSMB deployment
    - Decompression stops
    - Switch to decompression gas
    - Stage cylinder hand off
    - Static
- **Surface phase**
    - Hand up stages & exit
- **Post dive actions**

Open water lesson Open Water Dive 2

- **Dive planning**
    - Decompression dive with maximum of 15 minutes ascent time
    - Prepare run time slate
- **Pre-dive**
    - Equipment preparation
    - Waterside checks
    - Briefing
    - Pre-dive checks
    - Kit configuration and kit up
    - Buddy checks
- **Descent phase**
    - Bubble check
    - Travel gas to dive gas switch
- **Dive phase**
    - Weighting, trim & Buoyancy
    - Gas switches
    - Shut down and Isolation procedure.
    - Gas monitoring and management
    - Run time management
    - Bottom line

- **Ascent**
    - Run time management
    - Dive gas to travel gas switch
    - Mid-water DSMB deployment
    - Decompression stops
    - Switch to decompression gas
- **Surface phase**
    - Hand up stages & exit
- **Post dive actions**

Day 3

Open water lesson Open Water Dive 3

- **Dive planning**
    - Decompression dive with maximum of 30 minutes ascent time
    - Prepare run time slate
- **Pre-dive**
    - Equipment preparation
    - Waterside checks
    - Briefing
    - Pre-dive checks
    - Kit configuration and kit up
    - Visualisation of the dive
    - Buddy checks
- **Descent phase**
    - Lazy shot deployment
    - Bubble check
    - Travel gas to dive gas switch
- **Dive phase**
    - Weighting, trim & Buoyancy
    - Gas switches
    - Bottom line
    - Gas monitoring and management
    - Run time management
- **Ascent**
    - Run time management
    - Dive gas to travel gas switch
    - Shot line ascent
    - Lazy shot procedure

- Decompression stops
- Switch to decompression gas

- **Surface phase**
  - Hand up stages & exit
- **Post dive actions**

Theory lesson 6 Dive Manager Liaison

- **Qualifications**
- **“Duty of Care”**
- **Dive manager**
- **Dive manager’s slate**
- **Boat diving**

Day 4

Open water lesson Open Water Dive 4

- **Dive planning**
  - Decompression dive with maximum of 45 minutes ascent time
  - Prepare run time slate
- **Pre-dive**
  - Equipment preparation
  - Waterside checks
  - Briefing
  - Pre-dive checks
  - Kit configuration and kit up
  - Visualisation of the dive
  - Buddy checks
- **Descent phase**
  - Lazy shot deployment
  - Bubble check
  - Travel gas to dive gas switch
- **Dive phase**
  - Weighting, trim & Buoyancy
  - Gas switches
  - Bottom line
  - Gas monitoring and management
  - Run time management
- **Ascent**
  - Run time management
  - Dive gas to travel gas switch

  - Shot line ascent
  - Lazy shot procedure
  - Decompression stops
  - Switch to decompression gas
- **Surface phase**
  - Hand up stages & exit
- **Post dive actions**

Day 5

Open water lesson Open Water Dive 5

- **Dive planning**
  - Decompression dive with maximum of 60 minutes ascent time
  - Prepare run time slate
- **Pre-dive**
  - Equipment preparation
  - Waterside checks
  - Briefing
  - Pre-dive checks
  - Kit configuration and kit up
  - Visualisation of the dive
  - Buddy checks
- **Descent phase**
  - Bubble check
  - Travel gas to dive gas switch
- **Dive phase**
  - Weighting, trim & Buoyancy
  - Gas switches
  - Gas monitoring and management
  - Run time management
- **Ascent**
  - Run time management
  - Dive gas to travel gas switch
  - Mode of ascent
  - Decompression stops
  - Switch to decompression gas
- **Surface phase**
  - Hand up stages & exit
- **Post dive actions**

Knowledge assessment

Open forum and course debrief

Disperse

NOTES

1. Although this is a five day course, it is not necessary to run it over five consecutive days. Students may gain the benefit of time to prepare their equipment and to practice their new mixed gas diving skills. Relevant theory should precede practical training.

2. Instructors should base their teaching on the Advanced Mixed Gas Diver Instructor manual. A set of Microsoft® Office PowerPoint® 2003 Visual aids should be delivered for this course, and they are issued with the Advanced Mixed Gas Diver Instructor pack.

3. Suitably qualified BSAC Instructors (or equivalent) who wish to gain the Advanced Mixed Gas Diver Instructor status should apply to BSAC Technical Chief Examiner via BSAC HQ.