13. Trimix Instructor

13.1 Introduction

The TDI Trimix Instructor course provides the training required to competently and safely teach breathing gases containing helium with no less than 18 percent oxygen (O_2) for dives that require staged decompression to a maximum depth of 60 metres / 200 feet.

13.2 Qualifications of Graduates

Upon completion of this course, graduates may engage in teaching activities that utilize custom Trimix mixtures provided:

1. The diving activities approximate those of training
2. The area of activities approximate those of training
3. Environmental conditions approximate those of training

13.3 Who May Teach

1. Any active TDI Advanced Trimix Instructor Trainer may teach this course

13.4 Student to Instructor Ratio

Academic

1. Unlimited, so long as adequate facility, supplies and additional time are provided to ensure comprehensive and complete training of subject matter

Open Water

1. A maximum of 4 instructor candidates per active TDI Instructor Trainer are allowed; it is the instructor trainer's discretion to reduce this number as conditions dictate

13.5 Student Prerequisites

1. Minimum age 2l
2. Minimum certification as a TDI Trimix Diver and a TDI Advanced Nitrox and Decompression Procedures Instructor, or equivalent
3. Proof of 15 certified advanced nitrox or decompression procedures divers; minimum of 10 must be decompression procedures divers
4. Provide proof of 250 logged dives with a minimum of 20 logged Trimix dives outside of training, 10 of these dives must be in the last 12 months

13.6 Course Structure and Duration

Open Water Execution

1. Four dives with a minimum accumulated bottom time of 100 minutes
2. Two dives must be deeper than 45 metres / 150 feet

Course Structure

1. TDI allows instructor trainers to structure courses according to the number of students participating and their skill level

Duration

1. The recommended number of classroom and briefing hours is 8

13.7 Administrative Requirements

The following are the administrative tasks:

1. Collect the course fees from all the instructor candidates
2. Ensure that the instructor candidates have the required equipment
3. Communicate the training schedule to the instructor candidates
4. Have the instructor candidates:
    a. Complete the *TDI Liability Release and Express Assumption of Risk form*
    b. Submit the *TDI Medical Statement* form signed by a licensed physician

Upon successful completion of the course the instructor trainer must:

1. Issue the appropriate TDI certification by submitting the appropriate *TDI Dive Leader Registration* form to TDI Headquarters

13.8 Required Materials

1. *TDI Extended Range and Trimix* Manual or eLearning
2. *TDI Advanced Trimix Diver* Manual or eLearning
3. *TDI Trimix Instructor* Manual
4. *TDI Standards and Procedures* Manual

13.9 Required Equipment

The following are required for this course: The following equipment is required for each instructor candidate

1. Bottom mix cylinder(s)
    a. Cylinder volume appropriate for the planned dive and candidate gas consumption
    b. Dual outlet valve or manifold required
    c. Cylinder(s) labeled in accordance with TDI Standards
2. Decompression mix cylinder(s)
    a. Cylinder volume appropriate for planned dive and candidate gas consumption
    b. Cylinder(s) labeled in accordance with TDI standards
3. Suit inflation cylinder; required for dry-suit divers only
4. Regulators
    a. Primary and secondary first stages required on all back cylinder(s)
    b. Submersible pressure gauges are required on all primary/bottom mix cylinders
    c. One primary regulator must have a sufficient length hose for air sharing
    d. All 4 regulators must be interchangeable; possible separate primary and decompression regulators to match
5. Buoyancy compensator device(s) (BCD) as appropriate for equipment configuration
6. Redundant depth and timing devices such as:
    a. Air decompression computers allowed for use as depth and timing devices if in gauge mode
    b. Trimix computers
    c. Electronic bottom timer
7. Redundant light system (if required by site)
8. Ascent reel with lift bag
    a. Appropriate for planned maximum depth
    b. Minimum 23 kg / 50 lb delayed surface marker buoy or lift bag (a dump valve highly recommended)
9. Exposure suit appropriate for the open water environment
10. Line cutting device(s)
11. Underwater slate and writing device

13.10 Required Subject Areas

Instructor trainers must use the *TDI Trimix* Instructor Guide and current *TDI Standards and Procedures* Manual, but may also use any additional text or materials they feel help present these topics. The following topics must be covered in this course.

1. Physics
2. Pressure review
3. Physiology
    a. Hypoxia
    b. Oxygen Toxicity
        i. Whole Body
        ii. Central nervous system (CNS)
    c. Nitrogen narcosis
    d. Nitrogen and helium absorption and elimination
    e. Carbon monoxide (CO) toxicity
    f. Carbon dioxide (CO_2) toxicity
    g. Helium
        i. HPNS
        ii. Effects on respiration
        iii. Effects as an insulator
    h. Counter diffusion
    i. Hyperthermia
    j. Hypothermia
4. Decompression Options
    a. Air
    b. Nitrox
    c. Helium
5. Equipment Options
    a. Twin cylinder options
    b. Stage cylinder options
    c. Suit inflation options
    d. Regulator options
    e. Harness / BCD options
    f. Computer / depth gauge / bottom timer options
    g. Ascent and navigation reels
    h. Lift bags
    i. Lights
    j. Redundant mask and knife
    k. Jon-line

6. Dive Tables
    a. Computer generated tables
    b. *DCIEM Helitrox* Tables and / or other published tables
7. Dive Planning
    a. Operation planning
        i. Support
        ii. Teams
    b. Individual and team planning
        i. Gas requirements
        ii. Oxygen (O_2) limitations
        iii. Inert gas limitations
8. Proper gas switches
    a. Emergency planning
        i. Omitted decompression
        ii. Oxygen (O_2) toxicity
        iii. Decompression sickness
        iv. General
9. Procedures
    a. Bottom, travel and decompression gas
    b. Normal operations
    c. Establish appropriate emergency procedures
    d. Analyzing and logging

13.11 Required Skill Performance and Graduation Requirements

The following skills must be completed by the instructor candidate to demonstration quality; it is recommended that a minimum of 4 dives be conducted between 40 metres / 130 feet and 60 metres / 200 feet

1. Properly demonstrate analysis of all gas mixtures to be used
2. Demonstrate appropriate pre-dive planning
    a. Limits based on personal and team gas consumption
    b. Limits based on oxygen exposures at planned depths for actual mixes
    c. Limits based on inert gas absorption at planned depth with actual mixes
3. Properly execute the planned dive within all pre-determined limits
4. Demonstrate the proper navigational techniques for the specific dive
5. During 2 dives, demonstrate an ascent with reel and bag, while performing staged decompression
6. Demonstrate the proper procedures for switching and isolating malfunctioning manifold or primary regulators

Land Drills

1. Demonstrate familiarity with basic and intermediate hand signals
2. Select and prepare equipment suitable for soft overhead environment with long decompression obligations
3. Conduct team oriented drills for lift bag deployment and gas switching procedure
4. Drills for buddy rescue

Pre-dive Drills

1. Use START* before every dive
2. Stress analysis and mitigation

***START is S-drill (OOA drill and Bubble Check), Team (buddy equipment checks), Air (gas matching), Route (entry/exit and planned path underwater), Tables (depth, duration, waypoints and schedule).**

In-water Drills

1. Demonstrate buoyancy control
2. Show good awareness of buddy and other team members through communications, proximity and team oriented dive practices
3. Demonstrate competence managing two stage cylinders including drop and recovery while maintaining position in the water column
4. Demonstrate ability to confirm gas switches at depth with buddy/team members
5. Demonstrate lift bag deployment from depth and use of bag as back-up buoyancy device
6. Demonstrate air-sharing ascent from depth, no greater than 30 metres / 100 feet, while one member of buddy team is without mask or blacked out mask.
7. Create contingency decompression schedule after simulated loss of decompression gas
8. Demonstrate controlled ascent with simulated toxed diver, including surface tow at least 30 metres / 100 feet, with simulated equipment removal on surface (in water too deep to stand in) from victim

In order to complete this course, students must:

1. Satisfactorily complete the TDI Trimix course written examination and be able to adequately explain each answer to a prospective student
2. Demonstrate mature, sound judgment concerning training, dive planning and execution
3. Demonstrate proficiency in every skill required in the TDI Trimix Diver course
4. Demonstrate proficiency in teaching the TDI Trimix Diver course
5. Present at least 1 graded presentation on a Trimix topic