

## 13. Advanced Trimix Instructor

### 13.1 Introduction

The TDI Advanced Trimix Instructor course provides the training required to competently and safely teach breathing gases containing helium for dives that require staged decompression to a maximum depth of 100 metres / 330 feet. The objective of this course is to train instructors to teach the benefits, hazards and proper procedures of utilizing custom oxygen, helium, and nitrogen mixtures as breathing gases.

### 13.2 Qualifications of Graduates

Graduates may engage in teaching activities utilizing custom Trimix mixtures provided:

1. The diving activities approximate those of training
2. The areas of activities approximate those of training
3. Environmental conditions approximate those of training
4. May teach TDI Entry level Trimix or TDI Advanced Trimix

### 13.3 Who May Teach

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 time are provided to ensure comprehensive and complete training of subject matter

#### Confined Water (swimming pool-like conditions)

1. N/A

#### Open Water (ocean, lake, quarry, spring, river or estuary)

1. A maximum of 4 students per instructor trainer; it is the instructor trainer's discretion to reduce this number as conditions dictate

## 13.5 Student Prerequisites

1. Minimum age 21
2. Certification as a TDI Advanced Trimix Diver or equivalent
3. Certification as a TDI Extended Range Instructor or TDI Trimix Instructor or equivalent
4. Provide proof of 250 logged dives, of which 30 must be Trimix dives
5. Provide proof of 20 dives deeper than 55 metres / 180 feet

### And meet one of the following experience requirements:

1. Certify at least 10 extended range divers or Trimix divers to depths of at least 45 metres / 150 feet
2. Assist with at least 2 complete TDI Advanced Trimix classes taught by an active TDI Advanced Trimix Instructor and provide a letter of recommendation from the assisted instructor(s)

## 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 70 metres / 230 feet

### Course Structure

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

### Duration

1. The recommend 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 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 Standards and Procedures* Instructor Manual
2. *TDI Extended Range / Trimix* Student Manual
3. *TDI Extended Range / Trimix* Instructor Guide
4. *TDI Extended Range / Trimix* PowerPoint Presentation

## 13.9 Required Equipment

**The following equipment is required for each student:**

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. Labeled in accordance with TDI Standards
2. Travel mix cylinder(s)
  - a. Cylinder volume appropriate for planned dive and candidate consumption
  - b. Labeled in accordance with TDI Standards
3. Decompression mix cylinder(s)
  - a. Cylinder volume appropriate for planned dive and candidate gas consumption
  - b. Labeled in accordance with TDI Standards
4. Suit inflation cylinder; required for dry-suit divers only
5. Regulators
  - a. Primary and primary redundant required on all bottom mix 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. It is strongly recommended that all 4 required regulators be DIN or all 4 regulators be yoke
6. Buoyancy compensator device(s) (BCD) as appropriate for equipment configuration
7. Redundant depth and timing devices; air decompression computers allowed for use as depth and timing devices
8. Redundant light system (if required by site)
9. Ascent reel with lift bag
10. Adequate for planned maximum depth.
11. Minimum 23 kg / 50 lb lift bag / surface marker buoy, dump valve highly recommended
12. Exposure suit adequate for the open water environment
13. Line cutting device
14. Underwater slate

## 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
  - a. Pressure review
2. Physiology
  - a. Hypoxia
  - b. Oxygen (O<sub>2</sub>) 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<sub>2</sub>) toxicity
  - g. Helium
    - i. HPNS
    - ii. Effects on respiration
    - iii. Effects as an insulator
  - h. Counter diffusion
    - i. Hyperthermia
    - ii. Hypothermia
3. Decompression Options
  - a. Air
  - b. Nitrox
  - c. Helium
4. Equipment Options
  - a. Twin cylinder options
  - b. Stage cylinder option
  - 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

5. Dive Tables
  - a. Computer generated tables
  - b. *DCIEM Helitrox* Tables and / or other published tables
6. Dive Planning
  - a. Operation planning
    - i. Support
    - ii. Teams
  - b. Team planning
    - i. Gas requirements
    - ii. Oxygen (O<sub>2</sub>) limitations
    - iii. Inert gas limitations
  - c. Emergency planning
    - i. Omitted decompression
    - ii. Oxygen (O<sub>2</sub>) toxicity
    - iii. Decompression sickness
7. General Procedures
  - a. Bottom, travel and decompression gas
    - i. Normal operations
    - ii. Failure, loss or inadequate emergency procedures
    - iii. Analyzing and logging

## 13.11 Required Skill Performance and Graduation Requirements

The following skills must be completed by the instructor candidate. It is recommended that all dives be conducted between 55 metres / 180 feet and 100 metres / 330 feet.

1. Properly demonstrate analysis of all gas mixtures to be used
2. Demonstrate adequate pre-dive planning limits based on:
  - a. Personal and team gas consumption
  - b. Oxygen exposures at planned depths for actual mixes
  - c. Inert gas absorption at planned depth with actual mixes
3. Properly execute the planned dive within all predetermined limits
4. Demonstrate the proper navigational techniques for the specific dive
5. During 2 dives, demonstrate an ascent with ascent reel and bag; perform staged decompression
6. Demonstrate the proper procedures for switching and isolating a malfunctioning primary regulator

**In order to complete this course, students must:**

1. Satisfactorily complete the TDI Advanced 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 Advanced Trimix Diver course
4. Demonstrate proficiency in teaching the TDI Advanced Trimix Diver Program
5. Present at least 1 graded presentation on a advanced Trimix topic