# 4. Freediver

## 4.1 Introduction

This is the entry-level certification course is for individuals wishing to learn the fundamentals of proper breath hold diving for the purpose of increasing underwater awareness and enjoyment. An introduction to open water Freediving skills and techniques to depths no deeper than 20m / 66' are practiced with the program also encompassing static and dynamic apnea as introductory or stand-alone disciplines. A pool only certification may be issued to those not wishing to participate in open water training.

## 4.2 Course Objectives

The objective of this course is to train individuals in the benefits, skills, techniques and safety and problem management for entry level Freediving to a depth of 20m / 66 ft, with basic level static apnea development of 1:30 at a minimum and an optional dynamic apnea development of 25m / 82 ft.

## 4.3 Program Prerequisites

1. Minimum age of 10 for Junior Freediver or 16 years for Freediver
2. Competent swimming skills
3. PFI Snorkeler or equivalent skill level

## 4.4 Required Student Equipment

1. Mask, Fins, Snorkel
2. Exposure protection appropriate for local environment
3. Weight belt and weights appropriate for local environment
4. Timing device (preferred freediving computer or depth gauge)

## 4.5 Support Materials

### Student materials

1. *PFI Medical Statement*
2. *PFI Liability and Assumption of Risk form*
3. *PFI Freediver* Manual or eLearning

### Instructor materials

1. *PFI Freediver* Instructor Manual
2. *PFI Freediver* Instructor Guide

## 4.6 Qualification of Graduates

1. Upon successful completion of this course, graduates may engage in buddy supported freediving activities appropriate for the environment without direct supervision of an instructor to depths no greater than 20 meters/66 ft.
2. Upon successful completion of this course, graduates are qualified to enroll in the Freediver Coaching, Intermediate Freediver, Open line Diving and Specialty Freediver programs.
3. Divers may be certified with a Freediver-Pool Only certification after successfully completing all knowledge Development and Confined Water training sessions. There is no open water training necessary for this level of certification and divers at this level are not certified for any open water activities.

## 4.7 Who May Teach

This course may be taught by any active PFI Freediver Instructor. The PFI Freediver Instructor may use active status PFI Assistant Instructors to increase student ratios.

## 4.8 Student to Instructor Ratio

### Classroom

1. Unlimited, so long as adequate facility, supplies and time are provided to ensure comprehensive and complete learning.

### Confined Water

1. A maximum of eight students to one PFI Freediver Instructor (8:1). Or a maximum of twelve students to one PFI Freediver Instructor (12:1 max) with the use of active status PFI Assistant Freediver Instructors

### Open Water

1. A maximum of six students to one PFI Freediver Instructor (6:1). Or a maximum of ten students to one PFI Freediver Instructor (10:1 max) with the use of active status PFI Assistant Freediver Instructors

## 4.9 Depth Restrictions

### Open Water

1. Maximum open water depth of 20 meters / 66 ft.

### Confined Water

1. Maximum confined water depth of 10 meters / 33 ft.

## 4.10 Recommended Course Minimums

### Classroom

1. 6.0 Hours

### Confined Water

1. 5.0 Hours

### Open Water

1. 5.0 Hours

## 4.11 Knowledge Development Overview

The following topics must be covered during the course. Instructors may use additional texts or materials they feel help present these topics.

1. Introduction
    a. Participant and Staff Introductions
    b. Course Overview
    c. Paperwork and Prerequisites
    d. Equipment Requirements Check
    e. Classroom, Confined and Open Water Protocols and Conduct
    f. Safety / Supervision Practices
2. History of Freediving
3. Safety & Problem Management
    a. Freediving supervision
        i. Direct Supervision
        ii. One buddy up and one down
    b. Safety for depth freediving
        i. Being prepared
        ii. Remain close enough to PROTECT THE AIRWAY!
        iii. Time your buddies dive
        iv. Know which direction they are heading while under
        v. Rule of 9's

c. Safety and signals for static apnea
    i. Signal Agreement
    ii. Proper Signaling
    iii. Two strikes rule
    iv. Air release (loss of airway control)
    v. Target time and signals
    vi. Exiting a static apnea
    vii. Loss of Motor Control (LMC)/Blackout (BO)
d. Safety for dynamic (optional)
    i. Safety Positioning
    ii. Watch body style
    iii. Loss of airway control
    iv. Loss of Motor Control (LMC) /Blackout (BO)
e. Loss of Motor Control (LMC) and Blackout
    i. Depth Hypoxia vs. Apnea Hypoxia
    ii. Near Blackout, LMC, and Samba
    iii. Assisting an LMC at the Surface
    iv. Blackouts
    v. Assisting Blackouts at the surface
    vi. Responding to Bailouts and Blackout below surface
f. Buddy separation
    i. At the surface
    ii. Underwater

4. Breathing
    a. Respiratory muscles
        i. Diaphragm
        ii. Intercostals
        iii. Subclavian (scalene)
    b. Correct breathing cycles
        i. Normal ventilations
        ii. Ventilations
        iii. Purging
        iv. Peak Inhalation
        v. Recovery breathing
    c. Recovery breathing
        i. What is Recovery Breathing?
            1. Six most important breaths
            2. Upper chest
            3. Gas exchange and maintains cerebral blood circulation

4. Cleansing VS Hook breaths; 6Cleans VS 3Hook + 3 Cleans

ii. Static / Dynamic recovery breaths
1. Cleansing breaths

iii. Constant Ballast recovery breaths
1. Hook breaths; held for 3 seconds at full inhalation

d. Anxiety stimulus
i. Causes
1. Physical Stress
2. Physiological Stress
3. Psychological Stress

ii. Stress Reduction

5. Equipment for Freediving
a. Masks
i. Volume
ii. Fit
iii. Materials and types
iv. Maintenance

b. Fins
i. Blade length
ii. Materials and types
iii. Maintenance

c. Snorkels
i. Features
ii. Placement
iii. Submersion protocol
iv. Maintenance

d. Exposure protection
e. Wetsuits
i. Features
ii. Materials and types
iii. Maintenance

f. Hoods
i. Materials and types
ii. Equalizing

g. Gloves
i. Features
ii. Materials and types

h. Socks
    i. Features
    ii. Materials and types
i. Timing devices
    i. Waterproof Timers
        1. Features of watches
        2. Features of freediving computers
j. Weight systems
    i. Materials and Types
    ii. Weights
    iii. Placement
    iv. Buckles
    v. Accessories and maintenance
k. Buoyancy systems
    i. Snorkeling vests features and types
l. Lines, flags and floats
    i. Diver Below Flag
    ii. Alpha Flag
    iii. Floats & Lines
m. Accessory freediving equipment
    i. Freediving knives and placement
    ii. Lights and markers
    iii. Goodie bags and stringers
n. In-Water Environment
    i. Local aquatic animal and plant life
    ii. Local environmental conditions
        1. Water type
        2. Temperature and thermoclines
        3. Visibility
        4. Wind, waves and currents
        5. How to assess and plan accordingly
    iii. Local freediving procedures
        1. Boat/shore freediving
        2. In-water procedures
        3. Entry/exit procedures

6. Physics & Physiology of Freediving
    a. Pressure & volume changes
        i. Boyle's Law and its effects on a freediver

ii. Pressure and Body Air Spaces
    1. Pressure on rigid air space
        a. Sinuses
        b. Ears
    2. Pressure on semi-rigid airspaces
        a. Lungs
        b. Stomach / gastrointestinal
iii. Pressure and Equipment Air Spaces
    1. Mask and goggles
    2. Wetsuit compression

b. Equalization Techniques – body
    i. Equalizing Ears & Sinuses
    ii. Three methods of Equalizing and most preferred
        1. Frenzel
        2. Valsalva
        3. Swallowing, Yawning, Jaw Thrust
        4. Frequency
        5. Losing air during equalizing
    iii. Equalizing Issues
        1. Ears vs sinuses
        2. "Noisy" ears and unequal equalizing
    iv. Masks
        1. Frequency
        2. Recapturing air upon ascent

c. Pressure Related Injuries - barotrauma
    i. Barotitis Media
        1. Symptoms
        2. Causes
        3. Treatment
    ii. Sinus Squeeze
        1. Symptoms
        2. Causes
        3. Treatment
    iii. Perforated Eardrum
        1. Symptoms
        2. Causes
        3. Treatment
    iv. Reverse Block
        a. Symptoms
        b. Causes
        c. Treatment

v. Mask Squeeze
    1. Symptoms
    2. Causes
    3. Treatment

d. Buoyancy
    i. Archimedes Principle
    ii. Three States of Buoyancy
        1. Positive – Safety / technique
        2. Neutral – 10m / 33ft
        3. Negative – Safety / technique
    iii. Things that effect buoyancy
        1. Lung volume
        2. Wetsuits
        3. Weights
        4. Body type
        5. Salt vs fresh
    iv. Buoyancy Checks
        1. Surface 'collar bone' rule of thumb
        2. Slight positive at 5m/16ft
        3. Neutral at 10m/33ft

e. Types & causes of blackouts
    i. Insufficient oxygen to the brain to support higher function
    ii. Recovery Blackout
        1. 90% - Critical hypoxia or Pulmonary Dump
        2. Insufficient recovery breathing
        3. Blood pressure disruption
    iii. Ascent Blackout
        1. 10% (9% & 0.9%) – Critical hypoxia or 'Vacuum Effect'
        2. Rapid lung volume expansion and rapid drop in partial pressures

7. Aquatic adaptations
    a. Bradycardia
    b. Splenic contractions
    c. Blood shunt (peripheral constriction)
8. In-Water Training Exercises
    a. Confined Water Skills & Techniques
    b. Open Water Skills & Techniques
    c. Communications

## 4.12 Confined Water

To be certified as a PFI Freediver students must demonstrate the following skills to the satisfaction of the PFI Instructor:

1. Watermanship and Stamina (May be completed in open water. If done in open water, must be completed prior to any other open water skills)
    a. Distance swim of 200 metres non-stop using any stroke without the use of swimming aids (mask or swim goggles may be used), **or** 300 metres nonstop using mask, snorkel, and fins
    b. Tread water for 10 minutes without floatation

**Note:** If an exposure suit is worn for any of the above skills, the wearer must be neutrally buoyant at the surface.

2. Snorkel breathing
    a. Swim continuously at the surface without a mask for a minimum of 25m without removing face from the water while breathing continuously through the snorkel
3. Open Water Freedive Simulation
    a. Breathe up
    b. Descent with proper head position
    c. Equalizing at the surface and on the way down to the bottom of the pool
    d. Relaxed bottom kicking for 10 sec
    e. Ascent with proper head position
    f. Drop arms at 10m (simulated depth) and shallower
    g. Assist with a simulated surface LMC as a safety
        i. Physically support the freediver
        ii. Keep one hand on the chest above the waterline but below the chin.
        iii. Speak calmly to encourage the freediver to breathe.
    h. Respond to a simulated blackout at the surface
        i. Protect airway with "head sandwich"
        ii. Place freediver on their back into the "dosey-doe" position
        iii. Remove their mask
        iv. Blow, Tap, Talk 3 times
    i. Assist with a simulated underwater blackout
        i. Recognize freediver underwater signaling for assistance
        ii. Freedive, take control of the freediver asking for assistance
        iii. Recognize blackout before surfacing
        iv. Protect the airway with a "head sandwich"

v. Place freediver on their back into the "dosey-doe" position
vi. Remove their mask
vii. Blow, Tap, Talk 3 times
viii. 2 simulated rescue breaths

4. Static and Dynamic Apnea
    a. Static apnea
        i. As a breath-holder student must complete a minimum of 4 consecutive static breath-holds
            1. 1st session:
                a. Vent – hold ratio;
                    i. 1min - 1min
                    ii. 3min - 2min
                    iii. 3min - 2:30min
                    iv. 4min – 3min
            2. 2nd session (optional)
                a. Vent – hold ratio:
                    i. 3min – 2min; 4min – 3min, 5min – 4min
        ii. Complete a minimum 1:30 static apnea, not exceeding 4:00, without any hypoxic symptoms
        iii. As a safety student must complete:
            1. Buddy supervision
            2. Timing and safety signals
            3. Recovery breathing and support assistance
    b. Dynamic apnea (optional)
        i. As a breath-holder student must complete a minimum of 3 dynamic performances
            1. Vent – distance ratio:
                a. 1min – 25m
                b. 2min – 25m + turn
                c. 2min – 50m
            2. Streamlining and kicks appropriate for dynamic
            3. Complete a minimum 25m dynamic apnea, not exceeding 75m, without any hypoxic symptoms
            4. As a safety student must complete:
                a. Surface safety with floatation
                b. Recovery breathing and surface support assistance

## 4.13 Open Water

The following open water skills are to be briefed, evaluated, practiced and debriefed by the PFI Freediver Instructor and/or certified active PFI Assistant Freediver Instructor as outlined in the General Standards and Procedures section.

- During all skills students will act in a buddy team, surface safety and breath holder.

To be certified as a PFI Freediver a student must demonstrate the following skills to the satisfaction of the PFI Instructor as follows:

1. Open Water Training Sessions
    a. A minimum of one (1) open water session must be completed with two (2) recommended
2. Weighting and Buoyancy
    a. Establish positive buoyancy at approximately 5m/16ft after 1st level exhalation without sculling, finning, treading, or pushing off plate
    b. Establish neutral buoyancy at approximately 10m/33ft with peak inhalation without sculling, finning, treading, or pushing off plate
3. Fin Use
    a. Introduce proper kick cycles determinations to landmark depths
        i. landmark 10m/33ft kick cycles
        ii. landmark 15m/50ft and 20m/66ft kick cycles (optional)
    b. Dolphin kick (optional)
4. Free Immersion Warm-up Dives
    a. Complete a minimum of four (4) free immersion style freedives as a warm-up
    b. Reach a minimum of 10m/33ft without barotrauma or hypoxic symptoms
        i. Breathe up properly.
        ii. Remove snorkel
        iii. Descend using double or single leg descents.
        iv. Ensure proper head position.
5. Complete six constant ballast dives
    a. Reach a minimum of 10m/33ft without barotrauma or hypoxic symptoms
        i. Surface breathing and preparation
        ii. Remove snorkel
        iii. Double leg, or single leg raised entry

6. Demonstrate proper descent procedures
    a. Stay within arm's reach of descent line
    b. Face line during descent
    c. Maintain proper head neutral position
    d. Equalize frequently with arm tucked
    e. Descend at approximately 1m / 3ft a second
    f. Practice kick-cycle speed and depth determination
    g. Utilize line for an effective bottom turn
7. Demonstrate proper ascent procedures
    a. Double raised hands if flexibility and comfort allow
    b. Drop arms at 10m – 5m / 33ft – 16ft
    c. Recapture expanding air from mask if possible
    d. 2m/6ft exhalation prior to surfacing
    e. Proper recovery breathing

## 4.14 Graduation Requirements

**In order to successfully complete the course students must:**

1. Successfully complete all the knowledge development, confined water, and open water training sessions. Open water training is not necessary for Pool Only certification.
2. Demonstrate mature and sound judgment concerning planning and execution.
3. Achieve a passing score of 80% on the final exam and show whole knowledge comprehension.
4. Complete the following skills
    a. Equipment
        i. Prepare equipment with minimal assistance
        ii. Buddy check all equipment
    b. Entry and exit
        i. Enter water with techniques appropriate for the environment
        ii. Signal buddy/shore/boat
        iii. Exit water with techniques appropriate for the environment
    c. Proper weighting and buoyancy
        i. Test for approximate neutral buoyancy at surface by floating upright at collar bone without sculling, finning, or treading.
        ii. After buoyancy has been established – either collarbone for pool only, or 10m/33 ft during open water for Freediver, perform a first level exhalation at the surface - If the student sinks – they are over weighted

d. Snorkel Use
    i. Successfully clear and blast the snorkel without removing the head from the water
e. Proper fin use
    i. Flutter kick at the surface
    ii. Maintain a stationary position with sculling
f. Descent and Ascent Procedures
    i. Surface breathing and preparation
    ii. Remove snorkel prior to entry
    iii. Demonstrate a double leg raised entry or a single leg raised entry in the order of:
        1. Bend
        2. Leg(s)
        3. Pull
        4. Kick
    iv. Demonstrate proper ascent procedures
        1. Head in neutral position
        2. Recapturing expanding air in the mask if possible
        3. Exhale at approximately 2m/7 feet
        4. Proper recovery breathing
    v. During descents and ascents – student head position must remain neutral
g. Self-emergency Ascent Procedures
    i. Flooded mask ascent
        1. Fully flood at depth
            a. Pool only – deep end of pool
            b. Freediver – at 5m/16ft
        2. Remain at depth for approximately 10 seconds before ascending
        3. Ascent and recovery breathe in a controlled manner
    ii. Remove weight belt and ascend
        1. Remove weight belt at depth
            a. Pool only – deep end of pool
            b. Freediver – minimum 5m/16ft
        2. Ascend holding belt low at their side with buckle end down
        3. Perform proper recovery breathing
        4. Replace weight belt at the surface with right hand release

h. Recovery Breathing
    i. Proper exhalation from 2m/6ft
    ii. Position both hands on float/side of pool
    iii. Show proper 3 hook and 3 cleansing breaths on upper half of lung volume
    iv. Hook breaths are held for a full 3 seconds
i. Safety & Problem Management
    i. Assist with recovery breathing as a safety
        1. Be 2 meters/7 feet to 3 meters/10 feet to the side of the freediver
        2. Use audio coaching when necessary
        3. Remain attentive and vigilant for a minimum of 30 seconds after the freediver has surfaced
    ii. Respond to a simulated surface LMC as a Safety
        1. Physically support the freediver
        2. Keep one hand parallel to the water, above the water, but below the chin
        3. Speak calmly to encourage the freediver to breathe
        4. Maintain control until the freediver regains control
    iii. Respond to a simulated blackout at the surface
        1. Place the freediver on their back with the airway protected using a "head sandwich"
        2. Securely support the freediver's head with a "dosey-doe"
        3. Blow, tap, talk 3 times
        4. Maintain control until the freediver regains control
    iv. Assist with a simulated underwater blackout no deeper than 5m/16ft
        1. Recognize signal for assistance
        2. Physically support the freediver
        3. Ensure proper hand placement
        4. Recognize blackout before the surface
        5. Protect the airway with a "head sandwich"
        6. Perform surface blackout procedures through 2 rescue breaths once the student has ascended with the blacked out freediver

**Instructors must:**

1. Submit certifications to PFI Headquarters within 7 days of course completion date for processing.