5. Intermediate Freediver

5.1 Introduction
This follow-up program to the PFI Freediver course continues to develop the comfort and surface safety skills of basic level freediving. The PFI Intermediate Freediver is the foundation program for the PFI Advanced Freediver as well as professional programs. It brings a whole knowledge approach introducing skills and techniques as well as a high-level of knowledge in physics, physiology and safety & problem management. During this program participants work in depths as deep as 40m/132ft while learning valuable warm-up skills to enhance this capacity. This program encompasses static apnea and may also introduce dynamic apnea. A PFI Intermediate Pool Only certification may be issued to those not wishing to participate in open water training.

5.2 Course Objectives
The objective of this course is to train individuals in the benefits, skills, techniques and safety & problem management for Intermediate level freediving to a maximum depth of 40m/132ft with extended level static apnea development of 3:00 at a minimum and optional dynamic apnea development of 50m / 165 ft. This program will also focus on a high level of safety & problem management by learning how to take care of black-outs underwater and initiating BLS recovery procedures while also developing strong & soft kick cycles while also developing the sink phase part of negative buoyancy.

5.3 Program Prerequisites
1. Minimum age of 12 for Junior Intermediate Freediver or 16 years for Intermediate Freediver
2. Competent swimming skills
3. PFI Freediver or equivalent skill level
5.4 Required Student Equipment

1. Freediving quality mask, fins and snorkel
2. Freediving quality exposure protection (appropriate for local environment)
3. Freediving quality weight belt and weights (appropriate for local environment)
4. A timing device (preferred freediving computer or gauge)

5.5 Support Materials

Student materials
1. PFI Medical Statement
2. PFI Liability and Assumption of Risk form
3. PFI Intermediate Manual or eLearning

Instructor materials
1. PFI Intermediate Freediver Instructor Manual
2. PFI Intermediate Freediver Instructor Guide
3. PFI Intermediate Freediver final exam and answer sheet

5.6 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 40 meters/132 ft.
2. Upon successful completion of this course, graduates are qualified to enroll in the Intermediate Freediver Coaching, Advanced Freediver, Open line Diving, Freediver Safety, and Specialty Freediver programs.
3. Divers may be certified with an Intermediate 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.

5.7 Who May Teach

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

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

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

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

5.9 Depth Restrictions

Open Water
1. Maximum open water depth of 40 meters / 132 ft.

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

5.10 Recommended Course Minimums

Classroom time
1. 12.0 Hours

Confined Water time
1. 5.0 Hours

Open Water time
1. 7.5 Hours
5.11 Knowledge Development Overview

The following topics must be covered during this course by the PFI Intermediate Freediver

Instructor and/or active status PFI Assistant Intermediate Freediver Instructor as outlined in the PFI General Standards and Procedures section. 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
   a. Origin of freediving
      i. Roman and Greek armies
      ii. Ama Freedivers
      iii. Modern day freediving

3. Safety & Problem Management
   a. Freediving supervision
      i. Supervision
      ii. Proximity
      iii. Technique
   b. Safety for depth freediving
      i. Styles of depth freediving
      ii. Constant ballast
      iii. Constant ballast no-fins
      iv. Free immersion
      v. Rule of 9’s
      vi. Positioning and proximity
         1. Safety depth - meet at 1/3 Freediver’s max depth
            a. Safety time - intercepts Freediver 10sec after reaching safety depth (dive time +10sec)
         vii. 2, 3 and 4 person teams
c. Safety and signals for static apnea
   i. What is static apnea
   ii. Why train in static apnea
   iii. Signals
   iv. Two strikes rule
   v. Target times
   vi. Exiting a static apnea
   vii. Responding to emergencies

d. Safety for dynamic
   i. What is dynamic apnea
   ii. Why train in dynamic apnea
   iii. Safety positioning
   iv. Responding to emergencies

e. Performance evaluations
   i. Determine next target time, depth and distance
   ii. The 10 evaluation criteria
      1. Tired/exhaustion
      2. Technique
      3. Equalizations
      4. Near-blackout/blackout
      5. Urge to breath/contractions
      6. Pressure contractions
      7. Tired legs/failure
      8. Equipment performance
      9. Chest compression/squeeze
      10. Narcosis

f. Self-bailout underwater
   i. Steps of self bailout:
      1. Terminate the Freedive
      2. Use line for assistance
      3. Signal buddy for help
      4. Release weight belt and hold in hand for future release
      5. Drop weight belt
      6. Keep eyes open
      7. Discontinue freediving day with any signs of hypoxia
      8. Moderate freediving time, depth, distance, exertion
g. Assisted bailout underwater
   i. Bailout signal
      1. Hand signal and/or head signal
      2. Started before reaching safety at depth
   ii. Line signals
      1. Safety lightly holds line and feels for pulls
   iii. Provide support and propulsion
   iv. Under arm, waist or hands
   v. Utilize ascent line for propulsion assistance if possible
   vi. Monitor airway for LMC/BO
   vii. Ditch weight belt if required

h. Protective breathing reflexes
   i. Cessation of breathing
   ii. Restart breathing response with blow tap talk
   iii. Laryngospasms

i. Freediver rescue breathing (FRB)
   i. Create airway by ‘dosey doe’ position and head tilt
   ii. Remove mask
   iii. Three blow-tap-talks (BTT)
   iv. Call for assistance
   v. Rescue breaths

j. Near-blackouts (LMC)
   i. Near Blackout/LMC/Samba
   ii. Signs and Symptoms of near blackout / LMC
   iii. Assisting an LMC underwater
   iv. Assisting an LMC at the surface

k. Blackouts (BO)
   i. Depth vs. Apnea Hypoxia
   ii. Signs and symptoms of Blackouts / BO
   iii. Assisting Blackouts at the surface
   iv. Assisting blackouts underwater

l. Buddy separation
   i. Surface
   ii. Underwater
      1. Search patterns
         a. U patterns
         b. Expanding square
4. Equipment for Intermediate Freediving
   a. Masks
      i. Types
      ii. Features and materials
      iii. Proper maintenance
   b. Fins
      i. Mono-fins vs long fins
      ii. Benefits of long blade fins
      iii. Blade materials
      iv. Full foot vs. open heel foot pockets
      v. How to properly fit a fin
      vi. Proper maintenance
   c. Snorkels
      i. Features of a good freediving snorkel
      ii. Placement of snorkel on mask strap
      iii. Use
      iv. Proper maintenance
   d. Exposure protection
      i. Wetsuits
         1. Types
         2. Features and materials
      ii. Hoods
         1. Types
         2. Features and materials
      iii. Gloves
         1. Types
         2. Features and materials
      iv. Socks
         1. Types
         2. Features and materials
   e. Freediving computers
      i. Freediving computer vs timers
         1. Types
         2. Features
         3. Care and maintenance
f. Weight systems
   i. Types of weight systems
   ii. Rubber vs. nylon belts
   iii. Weights
   iv. Proper placement of belt
   v. Buckles
   vi. Accessories and maintenance

5. In-Water Environment
   a. Local aquatic animal and plant life
   b. Hazardous animals and plants
   c. Animals/plants of interest
   d. Local environmental conditions
      i. Fresh vs salt
      ii. Temperature and thermoclines
      iii. Visibility
      iv. Wind, waves and currents
      v. How to assess and plan accordingly
      vi. Sea sickness medications
   e. Local freediving procedures
   f. Entry/exit procedures

   6. Freediving Breathing Techniques
   a. Respiratory muscles / breathing segments
      i. Diaphragm
      ii. Intercostal
      iii. Scalene/subclavian
      iv. Neck
   b. Breathing techniques
      i. Normal ventilations
      ii. Ventilations
      iii. Purging
      iv. Peak Inhalation
c. Specialty breathing techniques
   i. Packing
   ii. Reverse packing

d. Recovery breathing
   i. Hook breaths
   ii. Cleanse breaths
   iii. Pool - static/dynamic recovery breaths
   iv. Ocean – depth/constant ballast/free immersion recovery breaths

v. Safety Procedures

e. Breathing exercises
   i. Segmented breathing
   ii. Negative diaphragm
   iii. Packing stretches
   iv. Reverse packing

7. Equalization Techniques – body
   a. Equalizing ears, sinuses and mask
   b. Methods of equalizing
      i. Frequency
   c. Equalizing Issues
   d. Masks

8. Physics of Freediving
   a. Depth and pressure
      i. Biggest change on our physiology
      ii. Weight 100km / 62miles of atmosphere = 14.7psi/1 bar/ 1ata at sea level
      iii. Every 10m/33ft of sea water is the equivalent of 1ata
   b. Pressure and volume
      i. Boyle’s Law
      ii. 5 airspaces affected by Boyle’s law
         1. Lungs, ears, sinuses, mask, wetsuit
         2. Lung compression vs importance of small mask volumes
         3. Not losing air during descents due to equalizing
         4. Re-inhale mask air volume during ascent
   c. Partial pressures
      i. Daltons law of pressures
      ii. Effects of varying partial pressures of O2 during a Freedive
   d. Buoyancy principles
      i. Archimedes’ principle
      ii. Three states of buoyancy
      iii. Effects of buoyancy
      iv. Descents and ascent techniques
e. Streamlining and hydrodynamics
   i. Density of water versus air
   ii. Drag and hydrodynamics

9. Physiology of Freediving
   a. Nervous system
      i. Central nervous system
         1. Peripheral nervous system
         2. Sympathetic/Parasympathetic nervous system
   b. Circulatory system
      i. Purpose
      ii. Functions
      iii. Differences between sexes
      iv. Relation to freediving
   c. Respiratory system
      i. Purpose
      ii. Functions
      iii. Differences between sexes
      iv. Relation to freediving
   d. Lung volumes and freediving
      i. Pulmonary function test
      ii. Main lung volume measurements:
         1. Inspiratory volume (IV)
         2. Expiratory volume (EV)
         3. Vital capacity (VC)
         4. Functional residual capacity (FRC = EV + RV)
         5. Packing volume (PV)
   e. What makes us breathe
      i. Reflex respiratory center (RRC)
      ii. Chemoreceptors
      iii. Stretch receptors
   f. Types of blackout
      i. 3 freediving blackouts
         1. Static blackout
         2. Ascent blackout
      ii. Whiteout
      iii. Excessive hyperventilation
      iv. Excessive lung expansion
      v. CO2/N2 blackouts
      vi. Barotrauma blackouts
g. Aquatic adaptations
   i. Mammalian diving reflex
   ii. Four main adaptations:
      iii. Blood shunting or blood prioritization
          1. Effects of immersion
h. Pressure and body airspaces
   i. Airspaces in the body
      1. Elastic
      2. Rigid
      3. Semi-rigid
   ii. Intestinal squeeze
i. Barotraumas – pressure related injuries
   i. Middle ear
   ii. Barotitis media
      1. Alternobaric vertigo
   iii. Transient vertigo
   iv. Mask squeeze
j. Physiological stresses and dangers
   i. Hypoxia
   ii. Hypercapnia
   iii. Hypocapnia
   iv. Decompression sickness

10. Psychology of Freediving
a. Anxiety Stimulus
   i. Physiology of stress
   ii. Causes
      1. Physical Stress
      2. Physiological Stress
      3. Psychological Stress
   iii. Stress Reduction
      1. Stop – Think – Act
      2. Employ Psychological techniques
   iv. Self-talk
   v. Step by step
   vi. Compensatory changes
   vii. Visualization

11. Training Programs for Freediving
a. In-Water Training Exercises
   i. Confined Water Skills & Techniques
   ii. Open Water Skills & Techniques
   iii. Communications
5.12 Confined Water

The following confined water skills are to be briefed, demonstrated, evaluated, practiced and debriefed by the PFI Intermediate Freediver Instructor and/or certified active PFI Assistant Intermediate Freediver Instructor as outlined in the PFI 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 Intermediate Freediver a student must demonstrate the following skills to the satisfaction of the PFI Instructor as follows:

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/82ft without removing face from the water while breathing continuously through the snorkel

3. Open Water Freedive Simulation
   a. Breathe up
   b. Remove snorkel
   c. Descent with proper head position
   d. 6 strong kick cycles and six soft kick cycles plus 10 seconds relaxed kicking against the bottom
   e. Ascent with proper head position
   f. Drop arms at 10m (simulated depth) and shallower

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 vent – hold – purge ratios:
            a. 2min – 1min – no purging
            b. 3min – 2min – purges start at approximately 0:30
            c. 4min – 3min – purges start at approximately 0:45
            d. 5min – 4min – purges start at approximately 1:00
2. 2nd optional static session vent – hold – purge ratios:
   a. 3min – 2min – no purging
   b. 4min – 3min – purges start at approximately 0:30
   c. 5min – 4min or unlimited – purges start approximately between 1:15

ii. Complete a minimum 3:00 static apnea without any hypoxic signs or symptoms

iii. As a safety, student must complete:
    1. Buddy supervision
    2. Monitor timing
    3. Perform safety signals
    4. Recovery breathing and support assistance

5. Dynamic apnea (optional)
   a. As a breath-holder student must complete a minimum of 3 dynamic performances
      i. Vent – distance ratio:
         1. 1min – 25m
         2. 2min – 25m + turn
         3. 2min – 50m
   b. Streamlining and kicks appropriate for dynamic
   c. Complete a minimum 50m dynamic apnea without any hypoxic symptoms
   d. As a safety student must complete:
      i. Surface safety with floatation
      ii. Recovery breathing and surface support assistance

6. Negative Pressure Dives
   a. Students work as Buddy A and Buddy B; switching back and forth after each dive
   b. Students must complete a maximum of 6 negative pressure dives
      i. 1 – 2; first level exhalation; mouth fill and Frenzel mouth fill out of mask through nose
      ii. 3 – 4; second level exhalation; focus on head position, practice mouth fills on bottom
      iii. 5 – 6; third level exhalation with mouth fill; focus on head position, relaxation and air management
   c. Complete at minimum, first level exhalation with proper equalization at minimum depth of 3m/10ft, or second level exhalation with proper equalization for pools shallower than 3m/10ft
d. Complete all dives as follows:
   i. Employ surface pre-equalizations; ½ way down and once on bottom
   ii. Hand over head for protection holding mask in place
   iii. Head down vertical position during sink and while on bottom (exception dive #6 where students may take heart rate relaxed on bottom)
   iv. Perform recovery breathing

e. As Safety provide supervision and assistance with recovery breathing.

5.13 Open Water

The following open water skills are to be briefed, may be demonstrated if a newly introduced skill, evaluated, practiced and debriefed by the PFI Intermediate Freediver Instructor and/or certified active PFI Assistant Intermediate 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 Intermediate 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 two (2) separate ocean sessions must be completed with three (3) recommended

2. Weighting and Buoyancy
   a. Establish positive buoyancy at approximately 5m/16ft after a 1st level exhalation without sculling, finning, treading, or pushing off plate.
   b. Establish neutral buoyancy at approximately 10m/33ft without sculling, finning, treading, or pushing off plate.

3. Fin Use
   a. Demonstrate proper kick cycles determinations to landmark depths:
      i. Landmark 10m/33ft hard kick cycles
      ii. Landmark 15m/50ft soft kick cycles
      iii. Landmark 20m/66ft soft kick cycles
      iv. Landmark 25m/82ft intermittent soft kick cycles
4. Free Immersion Warm-up Dives
   a. Eight free immersion warm-up dives
   b. Complete a minimum of eight (8) free immersion style freedives as a warm-up
   c. Must reach a minimum of 25m / 82ft without any hypoxic symptoms or barotraumas
   d. Employing the following proper techniques described below:
      i. Breathe up properly.
      ii. Remove snorkel
      iii. Descend using double or single leg descents.
      iv. Ensure proper head position.
   e. Facial immersion for 5min may be introduced on open water session 2
   f. A negative pressure dive with 1st level exhalation to a max 10m/33ft with ‘touch ’n go’ may be introduced as last warm-up procedure on open water session 2

5. Constant Ballast Target Dives
   a. Complete a minimum of eight (8) constant ballast style freedives
   b. Reach a minimum depth of 25m / 82ft without hypoxic symptoms or barotraumas
   c. Employ the following proper techniques described below:
      i. Surface breathing and preparation
      ii. Remove snorkel
      iii. Single leg raised descent
      iv. Proper head position
      v. Proper double kick cycle with strong and soft kicks
   d. Pause kicking and sink to target depth with intermittent maintenance kicks to keep descent rate.

6. Emergency Rescue & Problem Management
   a. Assist with a simulated surface LMC as a safety for a simulated 25m dive
      i. Meet freediver at proper safety depth of 10m.
      ii. Signal and respond to freediver’s signs and issues.
      iii. Physically support the freediver.
      iv. Keep one hand on the chest above the waterline but below the chin.
      v. Speak calmly to encourage the freediver to breathe.
b. Respond to a simulated blackout at the surface for a simulated 30m dive.
   i. Meet freediver at proper safety depth of 10m
   ii. Signal and respond to freediver’s signs and issues
   iii. Protect the freediver’s airway with a “head sandwich”
   iv. Place the freediver on their back into a “dosey-doe”
   v. Remove mask
   vi. Blow, Tap, Talk 3 times.

c. Assist with a simulated underwater blackout for a simulated 40m dive
   i. Meet freediver at proper safety depth of 15m.
   ii. Signal and respond to freediver’s signs and issues.
   iii. When freediver blacks out, protect airway with a “head sandwich”
   iv. Swim freediver to the surface and place on back and into “dosey-doe” position
   v. Remove mask and perform Blow, Tap, Talk 3 times
   vi. Perform 2 simulated rescue breaths and call for assistance
   vii. Begin to evacuate while performing simulated rescue breaths once every 5 seconds.

5.14 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 100% 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 Intermediate 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. Intermediate Freediver – at 10m/33ft
      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. Intermediate Freediver – minimum 10m/33ft
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
      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
v. Lost Freediver – completed no deeper than 10m/33ft
   1. Surface swim minimum 25m/82ft looking for “lost” freediver
   2. Locate freediver, catch breath, breathe up
   3. Make proper entry and simulate 25m/82ft dive – 6 strong kick cycles – 6 soft kick cycles – 5 seconds intermittent kicks
   4. “Victim” descends after rescuer completes 6th strong kick cycle and will lay on the bottom next to the freediver
   5. After completion of 25m/82ft descent simulation, rescuer secures victim’s airway with a “head sandwich”
   6. Ascend to the surface and place victim into “dosey-doe” and perform surface blackout rescue procedures
   7. Call for assistance and evacuate the victim 50m/165ft while simulating rescue breaths every 5 seconds