



NATIONAL CYCLING SYLLABUS

OUR SYLLABUS



**High Performance
Enhancing Methodologies**



**Cycling
Tactics**



**Equipment
Requirements**



**Cycling
Skills**



**Cycling
Etiquette**



6784 6621

Singapore Cycling Federation

A holistic manual for

Coaches

Cycling Enthusiasts

General Public



cycling.org.sg

OCBC Arena 5, Stadium Drive, #02-44, S397631



Table of Contents

Foreword by SCF President, Dr Hing Siong Chen	0
1. About the Singapore Cycling Federation	1
2. Introduction to the SCF National Cycling Syllabus	2
3. The World of Cycling	3
3.1 Cycling for Leisure	3
3.2 Basic Cycling Skills	3
3.3 Rules of the Road	7
3.4 How to Make Cycling Fun?	12
4. Cycling Disciplines	14
4.1 Road Cycling	14
4.2 Track Cycling.....	14
4.3 Mountain Biking (MTB)	16
4.4 BikeTrial.....	17
4.5 Bicycle Motocross (BMX) Racing.....	17
4.6 Esport	18
5. Understanding Bike Fit	19
6. Skills Test	25
6.1 Starting & Stopping	25
6.2 Riding in a Straight Line.....	25
6.3 Slalom Drill	26
7. Fundamental Movement Skills	27
7.1 Why Movement Skills Are Important for Children	27
7.2 Why Children Need Movement Skill Instruction.....	27
7.3 Understanding Children	28
7.4 What Are Fundamental Movement Skills?	28
7.5 Movement Concepts.....	28
7.6 Guiding Principles When Teaching Fundamental Movement Skills	29
7.7 Observing Children	32
8. Understanding Youth Athletes	34
8.1 Growth and Maturation	34
8.2 Issues with Early Specialization	34
8.3 Motivation.....	35
8.4 Nutrition and Hydration	36
9. What Makes a Good Coach	38

9.1 Qualities of an Effective Youth Coach	38
9.2 Youth Coaching Philosophy	39
9.3 Transformational Coaching	40
9.4 A Lifelong Learner	41
9.5 A Good Role Model	42
10. Effective Youth Coaching	44
10.1 Planning an Effective Age Appropriate Training Session	44
10.2 Risk Assessment and Safety Management	45
10.3 Talent Identification and Development	47
10.4 Understanding Long-Term Athlete Development	47
10.5 SCF’s Athlete Development Pathway – Foundation, Development, Excellence and Sustainability (FDES) Model	52
10.6 Instilling a Growth Mindset in Youth Athletes	53
10.7 Communications	53
11. Physical Preparation in Cycling	57
11.1 Basic Energy Systems	57
11.2 Training with Power	58
12. Yearly Planning Instrument (YPI) (Advance)	60
12.1 Periodized Training and Peak Fitness.....	60
12.2 Periodized Training Cycles.....	60
12.3 Progressive Training Phases	62
13. Training Terminology (Advance)	64
14. Cycling Training Zones (Advance)	66
15. Fitness Testing and Tracking (Advance)	69
15.1 Functional Threshold Power (FTP)	69
15.2 Critical Power Test.....	69
15.3 Ramp Test.....	70
15.4 Endurance Cycling Test (VO2Max)	70
16. Tactics in Cycling (Advance).....	72
16.1 Single Handed Cycling	72
16.2 Gear Shifting.....	72
16.3 Tactics for Race (Road).....	72
16.4 Tactics for Race (MTB).....	74
16.5 Tactics for Race (BMX)	74
17. Maintaining Your Bicycle.....	76
18. Code of Conduct.....	78

SCF National Cycling Syllabus

18.1 For Coaches and Teachers.....	78
18.2 For Parents	79
18.3 For Athletes	80
Appendix	82
REFERENCES.....	95
ACKNOWLEDGEMENTS	100

©2021 Singapore Cycling Federation

Republic of Singapore

All rights reserved. No part of this manual may be copied or reproduced in any form without prior written permission from the Singapore Cycling Federation.

Foreword by SCF President, Dr Hing Siong Chen



Dr Siong, as he is popularly known in the local cycling community, has been an avid competitive cyclist since 2005, specialising in road, mountain bike and cyclocross events in Singapore and around the region. He is currently a member of “Cycledelic” and has raced in teams like Life Extension, Joyriders Racing Team and Lapierre Asia Racing Team (UCI registered team). He is currently working full time as a Family Physician for Healthway Medical Group. Prior to this, he has held appointments in the National University Hospital, Tan Tock Seng Hospital, Kandang Kerbau Women’s and Children’s Hospital and the Singapore General Hospital.

In 2015, he took on the role of Honorary Secretary in Singapore Cycling Federation (SCF) and helped build the foundations of a good corporate governance and public confidence in SCF. Since stepping into the role of President in 2017, he has led his dedicated management committee and secretariat to strive for greater goals, most notably in the setting up of the SCF Cycling Academy (BMX, MTB and Road), the expansion of the Safe Cycling Programme to the public and to schools, and for SCF’s Charity Transparency and Governance Award in 2018.

The SCF National Cycling Syllabus

Notwithstanding our achievements in the last five to six years, I strongly feel that the SCF needs to continue to look ahead, be ambitious and bold to ensure a sustainable way forward for the development of the sport of cycling in Singapore. Two mid-term strategic objectives include the promotion of cycling in schools as well as the active engagement with local cycling clubs to develop their youth development and performance infrastructure and, as a consequence, establish pathways into the National Development and National Training Squads. The SCF National Cycling Syllabus has, as such, been developed as a resource guide for both individuals who are keen to learn more about cycling as well as Clubs, Schools and Interest Groups to use.

The inspiration behind the SCF National Cycling Syllabus came primarily from SCF’s General Manager Mahipal Singh and SCF’s team of high performance coaches – Hairul Nazwa, Adrian Ng and Shayne Bannan. Their individual experiences have been instrumental in making the Syllabus an easy-to-understand resource guide. I am also thankful to the National Youth Sports Institute (NYSI) and Sport Singapore for allowing us the use of some of their materials in the SCF National Cycling Syllabus. I would also like to express my deep appreciation to Nanyang Polytechnic’s Senior Lecturer, Ms Tok Lee Ching and her team in the School of Business Management for their tireless efforts in the development of the Syllabus.

I am optimistic that the years ahead will continue to see a positive growth of Cycling as a form of commute, a leisure activity and in the realm of high performance sporting achievements. I urge all readers to utilise the guide actively and to always remember to Stay Safe when on your bike and ensure that you manage your cycling activities or programmes in a safe, conducive environment.

1. About the Singapore Cycling Federation

The Singapore Cycling Federation (SCF) was established in 1958 and is registered with the Registry of Societies.

It is recognized by Sport Singapore (Singapore Sports Council) as the national governing body for the promotion and development of the sport of cycling (BikeTrial, Bicycle Motocross [BMX], Mountain Bike [MTB], Road and Track) in Singapore, and is affiliated to the Singapore National Olympic Council (SNOC), the ASEAN Cycling Association (ACA), the Asian Cycling Confederation (ACC) and Union Cycliste Internationale (UCI).

The SCF is also a Charity and an Institution of Public Character (IPC).

SCF is the national federation for cycling in Singapore recognized by the world body Union Cycliste Internationale (UCI) and its affiliated Asian Cycling Confederation (ACC). Among other things, SCF is responsible for the licensing of competitive cyclists, sanctioning of local cycling events, and to ensure compliance with UCI international regulations in competitions world-wide, involving Singapore-registered cyclists and Singapore-registered teams.

SCF represents the interests of six main cycling disciplines:

1. Road (including Time Trial)
2. Track
3. MTB
4. BikeTrial
5. BMX racing
6. Esport Cycling



SCF aims to promote cycling in Singapore by developing both the recreational (represented by the grey circle) and competitive (represented by the red circle) aspects of the sport and all its respective disciplines.

The logomark is integrated into several icons representing the various disciplines in cycling.



Figure 1.1 Logomark of Different Disciplines

2. Introduction to the SCF National Cycling Syllabus

Cycling is a fun and exciting sport that can be enjoyed with families and friends. It can also be an avenue of choice for the competitive individuals. With those in mind, this manual has been written for anyone who wishes to pick up cycling either as a recreational or competitive sport. The manual aims to provide useful information and resources to equip individuals with the knowledge they need to start their journey in the world of cycling.

The manual begins with a general description of cycling skills and different cycling disciplines before proceeding to cover areas related to fundamental skills for children, youth coaching and good coaching skills. The final sections of the manual are dedicated to competitive cycling and covers topics such as physical preparation & training, fitness testing and competition tactics.

Throughout this manual, there are practical tips blended with facts and theories to enhance one's learning and understanding of the various aspects of recreational and competitive cycling.

Have an amazing journey.

3. The World of Cycling

The use of bicycles in our daily life, covers everything in recreational form, transport and utility, as well as professionals that train and perform in sporting events. Some reasons for cycling being so commonly used on regular basis are the ease of use, being inexpensive, easy maintenance, reduction in pollution and is convenient.

There are many benefits to cycling. It serves as a means of transportation, recreation, exercise or sport. Cycling can also include riding of unicycles, tricycles, recumbents, or stationary bikes.

3.1 Cycling for Leisure

Leisure or Recreation is an essential element of human biology and psychology, and is often done for enjoyment, amusement, or pleasure. Cycling for leisure is often about seeing and exploring new places on a bike, riding at pace or even long hours in the saddle to achieve cycling goals.

Cycling for health and general fitness causes less strain and injuries than most other forms of exercise (e.g. running, soccer, basketball etc). It uses all the major muscle groups as you pedal and is easy and does not require high level of skill. Once you have learnt how to ride a bike, you do not forget.

Regularly engaging in cycling activities, done at a leisurely pace, can provide the following health benefits:

- Increased cardiovascular fitness
- Increased muscle strength and flexibility
- Improved joint mobility
- Decreased stress levels
- Reduced anxiety and depression



Figure 3.1 Family Fun Cycling

Cycling is an experience of age-old fun that is truly exhilarating and freeing. People of all ages and from all walks of life can enjoy it. Besides potential health benefits, there are several advantages to cycling, including saving time and money and reducing levels of stress. There are many ways to make cycling fun and enjoyable. Cycling can bring one person from point to point, but in an environmentally friendly way as it does not produce any carbon emissions. However, before any beginner should cycle on the road, footpath and park connector networks, it is very important that he/she is confident to handle and move on a bicycle.

3.2 Basic Cycling Skills

To begin with cycling, there are a few skills to be practiced ensuring a smooth journey from one point to another safely. It is recommended to practice these skills in a safe environment with little to no traffic and ample space for the cyclist to apply these skills. Once the cyclist is ready, he/she is ready to cycle along with the traffic or on the pavement and park connector

networks (PCN). These skills and knowledge are best to be frequently practiced and revised to ensure that cycling can be safe and fun for all.



Figure 3.2 Good Cycling Posture

- Pushing & Carrying
 - Carry bike on non-drive train side

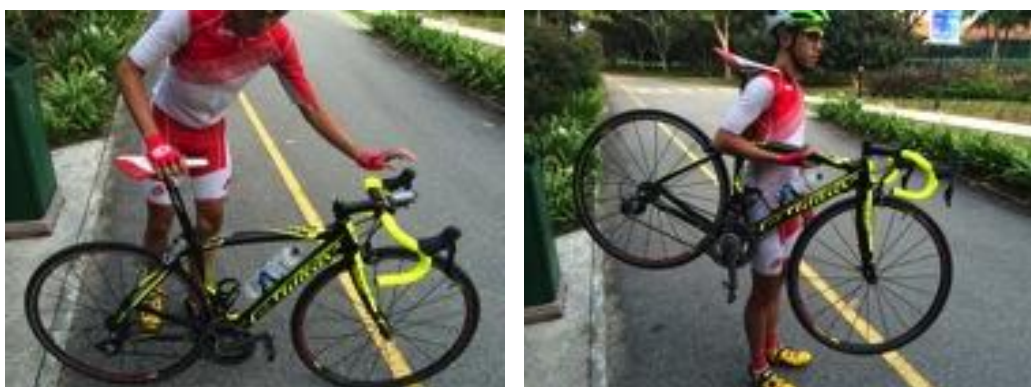


Figure 3.3 Carrying a Bike

- Mounting/Getting On
 - Always mount on the non-drive train side to avoid scratches and cuts by the chain ring.



Figure 3.4 Mounting/Getting on

- Dismounting/Getting Off
 - Dismount on non-drive chain side to avoid scratches and cuts by chain ring

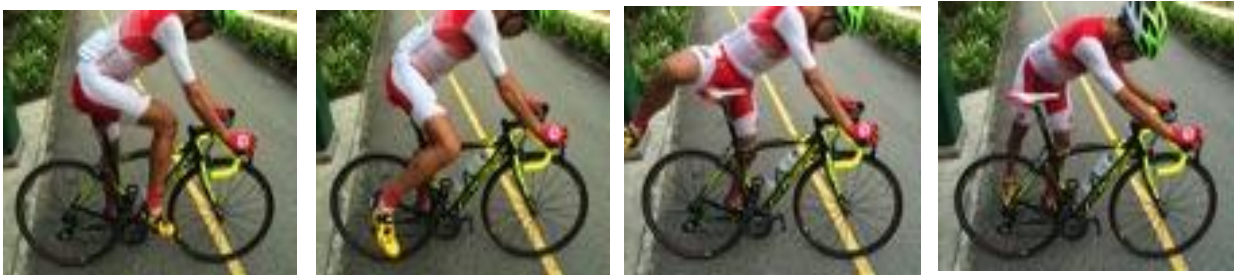


Figure 3.5 Dismounting/Getting Off

- Balancing Without Putting Foot on The Ground
 - Increase speed to help balance



Figure 3.6 Balancing

- Starting Off

Tip: Keep handlebars straight and position pedal horizontally applying light pressure on brake, check surroundings before starting off



Figure 3.7 Starting Off

- Pedalling

Tip: maintain neutral and relax body position, eyes scanning the intended path ahead

- Braking/Stopping

- When stopping, use both brakes. Engaging the front brake is more effective in stopping.



Figure 3.8 Braking/Stopping

- Riding in a Straight Line

- When riding in a straight line, your focus should be looking straight ahead and not directly below on your intended path, keep moving as this helps you maintain a straight line.



Figure 3.9 Riding in a Straight Line

- Focus your attention and scan your path for potential hazards. Look far ahead and plan your intended path of travel, slow down if unsure and get ready to break.



Figure 3.10 Focus and Look Far Ahead

Area	Description
Posture	Ability to balance when seated on the saddle of the bicycle.
Visual Conditioning	Possess spatial awareness of what is nearby and what is the cyclist approaching into.
Steering Balance	Ability to balance the steering handlebar with minimal jerking and unnecessary turning of the bar.
Pedalling	Ability to accelerate oneself on the bicycle efficiently and control the speed of the bicycle.
Brakes Application	Ability to decelerate or stop safely with both brakes. All leisure bicycles are to have at least one hand brake (preferably the hind brake).
Tuning Initiation	Ability to make sharp and gradual turns safely.
Gear Selection (Cycling Up and Down Slopes)	Ability to shift gears to suit the approaching terrains. Bigger shift - Flat or descending surface. Smaller shift - Rocky or ascending surface.
Hazard Identification	Ability to identify dangerous situations or incoming hazards and avoid it safely.

Table 3.1 Basic Cycling Skills

3.3 Rules of the road

Road safety can prevent major accidents from happening. It is important for a cyclist to understand, adhere and apply the knowledge to prevent any serious injuries or even loss of life. These are simple steps and recommendations that will help a cyclist to have a safe and enjoyable ride.

Safe Cycling Attire

- Wear a well-fitting bicycle helmet to protect yourself against head injuries in an event of a fall.

- Wear proper covered shoes and ensure that laces are secured properly.
- Wear light/striking coloured clothing to enhance your visibility to other road users.

Positive Safe Cycling Behaviours

- ALWAYS keep to the left-hand edge of the road or cycling path.
- ALWAYS obey traffic light signals.
 - Prepare to stop when approaching traffic light junctions when traffic light turns amber.
 - Stop when the traffic light turns red.
- Dismount from your bicycle and ensure that it is safe to cross before proceeding to cross the traffic light junctions.
 - Practice the habit of “Look Right. Look Left. Look Right Again.” before crossing.
- Be considerate to pedestrians on footpaths.
- Give pedestrians advance warning as you approach them by ringing your bell.
- Use hand signals to inform other road users of your intention to stop, slow down or when making a turn.
 - Refer to Road Traffic (Bicycles) Rules on proper hand signals to make.
- Always keep a lookout for other road users.



Figure 3.3 Keeping to Left of Cycling Pathway

Negative Safe Cycling Behaviours

- Do not cycle more than two cyclists side by side in the same direction.
- Do not cycle along the footway and on the expressways.
- Do not cycle across pedestrian crossings and overhead bridges.
- Do not cycle against the flow of traffic.
- NEVER assume your right of way and always remain vigilant and road safety conscious while cycling on the roads.
- Do not angle the bicycle headlight that it shines directly at the face of the oncoming cyclist.



Figure 3.4 Cyclists Cycling Side by Side Blocking the Pathway

Cycling with a Pillion Passenger

- Pillion aged 12 and below must be seated in a properly constructed seat or carrier secured to the pedal bicycle.

Road Safety Advice and Tips for Cyclists

- Wear light coloured clothes to ensure that you remain visible at all times
- Wear a helmet, protective pads and proper shoes to prevent serious injury
- Always check your bike before you cycle
- At pedestrian crossing, always dismount and push your bike across
- *(The speed that cyclists are moving at will catch most motorist off guard, leaving motorist little time to respond)*
- Obey traffic rules, signs and regulation of the road
- Always cycle on the left side of the road
- Never cycle on expressways
- Never cycle against the flow of traffic
- Install front & rear lights/reflector during hours of darkness
- Properly secured seat required for pillion riders <12 years old
- Always obey traffic light signals
- Cycle with traffic when on roads
- Dismount at pedestrian crossings & push your bike across
- Do not cycle along footways, expressways, overhead bridges.

Adapted from Traffic Police Department, Singapore

Do's	Don'ts
Check your bike to make sure it is in good condition before riding	Ride in a zigzag manner
At designated crossing, dismount and act as if you're a pedestrian – look right, left, and then right again. When the road is clear, push your bike across the crossing	Carry anything, walk a dog, hold an umbrella or occupy one hand while cycling
Use hand signals to warn other road users of your intentions	Risk injuries by performing dangerous stunts
Be extra alert at road junctions	
Stop your bike completely at "Give Way" and "Stop" signs	
Before crossing at junctions with traffic lights, always look to see if there are no vehicles coming from the left and right	
Wear light-coloured clothing or reflective gear at night	

Table 3.2 Road Safety Advice and Tips for Cyclists

Refer to **Appendix 1** for the Road Traffic (Bicycles) Rules for further elaboration on specific rules for cyclists.

Park Connector Network (PCN) Etiquette

- Ensure bike and bike equipment
- Keep to the left side of the track
- Ride in a single file
- Avoid weaving along the track
- Speeding is dangerous
- Keep a safe distance from other users to avoid collisions
- Slow down and give way to other users, especially at crowded or narrow areas.
- Do not overtake others when approaching places such as pedestrian crossings, corners and bends.
- Pedestrians have the right of way on pedestrian crossings
- Keep both hands on the handlebars unless signalling
- Signal in good time before you make a change in direction
- Wear protective cycling gears (i.e. Helmet)

Cycling Surface Hazards

- Wet conditions
 - Braking distance is doubled and poor when wet. Plan your approach and look ahead, avoiding sudden braking by slowing down.
 - In the majority of situations, do NOT lean into the corner. Instead, firstly slow down using both brakes in advance. Secondly, make the turn by turning your handlebars in the intended direction. Also getting ready to put your feet down on the ground immediately if necessary.



Figure 3.5 Wet Condition

Tip: When wet, approach metal or smooth concrete surfaces at a slow speed ready to stop completely

- Firm and dry
 - Look out for irregular surfaces like pot-holes or loose surfaces such as sand along your intended path. Drain gratings which run parallel to your wheel that may cause your wheel to get stuck or a slight raise in a road curb that runs parallel to your wheel which you may not be able to ride over ensure that you approach at a 90 degrees angle any small curbs that your wheel is able to roll over.

Tip: Look far ahead by constantly checking for surface hazards of your intended path. Avoid or slow down and stop if necessary

- Loose surface

Loose surface will affect the bike's cornering and braking ability. Plan your braking and cornering ahead. Only turn your handlebars in the intended direction and do not lean into the intended direction as this may cause the front wheel to lose grip. Avoid any last minute braking.

Hot/Sunny Weather

Plan your route to ensure stop for refuelling/refilling of drinks.

Tip: You would need an average of 1 full bottle 600 – 800 ml for every hour of cycling. If your activity is longer than an hour, you may want to supplement your water with a sports drink which provides energy and electrolytes. Sunscreen combined with long sleeves

prevents excessive exposure. Young children are not able to regulate heat as well as adults as their sweat glands are not fully developed, provide frequent water breaks and shade away from the hot weather.

- Lightning check available online:

<http://online.weather.gov.sg/lightning/lightning/lightningalertinformationsystem.jsp>

Source: National Environment Agency

- Rain check available online:

<http://app2.nea.gov.sg/weather-climate/weather-information/rain-areas>

Source: National Environment Agency

Cycling at Night

- Visibility is a challenge for drivers who are used expecting only vehicles and not expecting bikes.
- Ensure bright front and rear lights are fixed and switched on.

Tip: Choose AAA sized batteries for your front and rear LED lights as these are brighter, last longer and are easily replaceable. Wear light coloured cycling attire, avoid dark colour attire.

3.4 How to Make Cycling Fun?

Cycle with Family or Friends

Instead of spending your weekends with your family or friends watching TV, why not opt out for a cycling day, outdoors, or if it rains you can choose to ride in the virtual cycling world, indoors.

Cycle Along a Quiet Route

It is easy to let yourself follow the same route you would take in a car or a bus, as a normal bike commuter. Get a map and bike away from busy roads in order to enjoy the wind in your face. The journey would be much more fun with rail lines, bike lanes, backstreets, and canal routes. Who knows, you might even remember that you had no idea it existed on one side of the city.

Stop and Take in Your Surroundings

Often, the whole point of cycling is overlooked by people. Consider having a stop at places with stunning scenery to take it all in the next time you go cycling. There is some pleasure that comes from seeing the beautiful landscape. These stops add a new gratifying aspect to the cycle routes that you have used countless times to watch squirrels and rabbits hop around lush green fields.



Figure 3.5 Western Adventure Loop

Refer to **Appendix 2** for a list of Local Cycling Venues.

4. Cycling Disciplines

4.1 Road Cycling

The discipline of road cycling takes place on paved roadways just as its name implies. Considered to be the most traditional, popular and purest form of bike racing, road cycling takes on many different forms. Events contested on the road include Road Races, Time Trials, Multi-day Stage Races, and Criteriums. However, the only events competed in the Olympics are the Road Race and Time Trial.

For the Road Races, riders start together in a bunch. They may cycle from one point to another or comprise laps of a circuit; some courses combine both, i.e., taking the riders from a starting place and then finishing with several laps of a circuit (usually to ensure a good spectacle for spectators at the finish). Professional single-day road race distances typically range from 160km to 250km.



Figure 4.1 Competitive Cycling

Races over short circuits, often in towns or city centres, are known as criteriums. The circuits usually cover only 1 to 2km, comprising of technical turns and fast straight sections. Cyclists negotiate the course, with many accelerations and decelerations, and the race is often very tactical. Cyclists who are lapped by the lead group will be eliminated, and not allowed to continue the race. A mix of good technical skills, such as the ability to corner smoothly, riding safely within a large group and have the capacity to repeatedly “sprint” when accelerating hard out of corners. Race lengths are determined by completing several laps, or total time (commonly 1 hour).

A Time Trial is an event in which cyclists race against the clock on flat or rolling terrain, or up a mountain road. The cyclists start the race at different times so that each start is fair and equal. There can be individual time trials, or team time trials depending on the competition format. Race distances may vary largely, from as short as 15km to longer distance of 100km.

4.2 Track Cycling

Track Cycling is competed in a velodrome, relatively like a running track. It is an arena that features oval tracks consisting of two 180-degree circular bends connected by two straights but with steep banks (tilted tracks).

The track bike is a fixed-gear bicycle; thus, it has only a single gear ratio and has neither a freewheel nor brakes. Tyres are narrow and inflated to high pressure to reduce rolling resistance.

The Olympic track cycling program currently features five events: team sprint, match sprint, keirin, omnium, and team pursuit. The madison, an old event that was dropped in the 2012 London Olympics, but would be returning in the Tokyo Olympic Games, increasing the number of events to six.

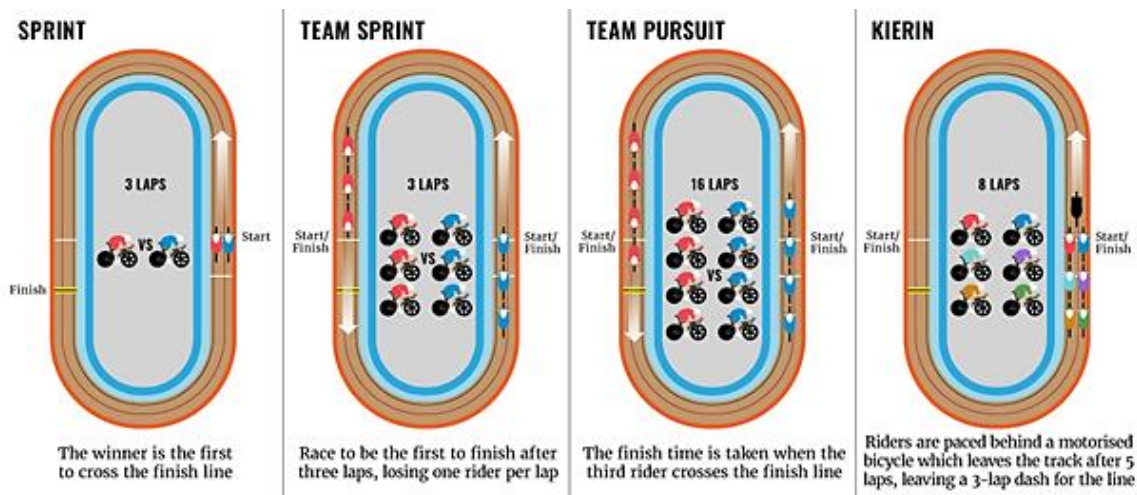


Figure 4.2 Different Disciplines of Track Cycling

The match sprint is a one-vs-one format with two riders starting at the same point on the track. While the race is for 750 metres, only the final 200 metres are timed. Early laps are usually raced at low speed, with riders sometimes coming to a complete stop as they battle one another for position, trying to force their opponent to the front which is less advantageous until the final sprint. The first rider across the finish line wins.

The team sprint is, in the men's event, a three-man team time trial held over three laps of a velodrome, and, in the women's event, a two-woman event held over two laps. Two teams start on opposite sides of the track. After every round, the leading rider peels off and exits the race for the next rider to finish.

Individual pursuit: a 4 km individual pursuit, with placing based on time.

In the team pursuit, two teams of four riders start on opposite sides of the track, racing against each other to be the first to complete 4km. Riders follow each other in close formation, each taking turns on the front. When the lead rider has completed their turn, they peel off the front, swing up the track and then re-join the team at the rear.

For the keirin, between three and seven riders compete in a sprint race of 600-700 metres after having followed in the slipstream of a pacing motorbike (deryn) for the first 1,400m. The motorbike gradually increases in speed from 30 to 50kph for the men, and from 25 to 45kph for the women before peeling off and letting the sprinters battle it out.

The omnium competition consists of six events. During the first five events, riders receive points depending on their place. For the final points race they can obtain points by winning sprints and taking laps during the event.

Scratch race: a 15 km scratch race, with all riders competing at once and first across the line winning.

Elimination race: a "miss-and-out" elimination race, with the last rider in every sprint (each two laps) eliminated.

Time trial: a 1 km time trial, with two riders (starting opposite the track) riding at once.

Flying lap: an individual time trial over 250m with a "flying start".

Points race: a 40 km points race, with scoring for intermediate sprints as well as for lapping the pack.

In the madison, two-man teams contest the mass-start event, which is typically 50-60 kilometres. Only one rider from each team is allowed in the race at a given time. Teammates hand-sling one another in and out of the race; resting riders circle the top of the banking.

4.3 Mountain Biking (MTB)

The activity of riding bicycles off-road, often over dirt, rocks, in trail paths using specially designed mountain bikes. It can be generally broken down to different categories: Cyclocross (CX), Cross-Country Eliminator (XCE), Downhill (DH), and Cross-Country (XCO).

A modern mountain bike demands a lightweight and efficient design for endurance. There are quite a few different types and designs for each category of mountain biking, with differing geometry of the bike frame, different widths of handlebars and different specifications on the suspensions.



Figure 4.3 A Typical Mountain Bike

Cyclocross is a mix of on-road and off-road cycling. Most events are held on short circuits, mixing tarmac, sand, dirt, mud paths and even steps and hurdles. A race typically runs over 30 minutes to an hour. Similarly, to road criterium racing, lapped cyclists are removed from the course and is not allowed to continue. Cyclocross racing mixes many athletic endeavours, with emphasis on riding, running, and bike handling.



Figure 4.4 Cyclocross Athlete in Action

Cross-Country Eliminator is a dynamic, fast action-packed race format. Riders will race in heats on technical tracks featuring obstacles that includes jumps and bridges. The track is short in distance of only between 500m to 1000m, and only takes 1 to 2 minutes. Riders race each other in heats of four, and the process continues till the final four riders contest the final.

Downhill riding is much more intense and is also exciting to spectate. It usually attracts the more advanced and extreme riders who loves speed as they race down descents comprising of rocks, massive drops and rough root sections. Riders would usually walk the route to determine the fastest and safest route to navigate through at high speeds.

Cross-Country is the most popular discipline in mountain biking. It is the only one competed in the Olympics making its debut as an Olympic discipline in 1996 at the Atlanta Games in the USA, with a cross-country event for both men and women. Trails normally vary from open and wide paths to winding narrow single tracks that tests the rider's endurance and bike handling skills. The race varies from 6 to 8km, and often takes between 1 hour 20 minutes to 1 hour 40 minutes.

4.4 Bike Trial

Bike Trial is the ultimate test of bicycle handling skills, with the slow negotiation of man-made and natural obstacles where setting a foot down constitutes a penalty. It tests riders' balance, controlled braking, and track standing skills. Bicycles used for this discipline are ones with lightweight parts, powerful brakes and usually have no seats.



Figure 4.5 Bike Trial

4.5 Bicycle Motocross (BMX) Racing

BMX racing are sprint races on purpose built off-road single lap race tracks. The track usually consists of a starting gate for up to 8 riders, a groomed, serpentine, dirt race course made of various jumps and rollers and a finish line. It is highly technical and requires strength, nerve and tactical ability. The course is usually flat, about 4.6 metres wide and has large banked corners that help riders maintain speed which makes it one of the most exciting forms of cycling for both to watch and to take part in.



Figure 4.6 BMX in Action

4.6 Esport

The newest discipline in cycling.

Cycling esports was officially approved as the newest discipline in cycling at the UCI Congress in September 2018. It is the first virtual sport to be awarded official discipline status by an International Governing Body and has rapidly become the fastest growing area within cycle-sport. Zwift and the UCI are now closely collaborating to develop cycling esports - a sport that combines the virtual and the physical, is equal across gender, accessible to all, and most importantly, fun.

Zwift now hosts over 180 grassroots esports competitions per day alongside year-round elite competition, featuring the biggest names in cycling. Recently, the delivery of the inaugural Virtual Tour de France in July 2020 provided a historic moment in the development of the discipline, showcasing Cycling Esports to over 14 million people around the world.

With over two billion gamers in the world the growth of esports is on a collision course with traditional sports disciplines. Through cycling esports we aim to bridge the gap between the two; by creating sporting experiences that are fun to play and viewing experiences that are fun to watch. In doing so we will engage a whole new generation of cycling fans and provide an entry point to all forms of the sport

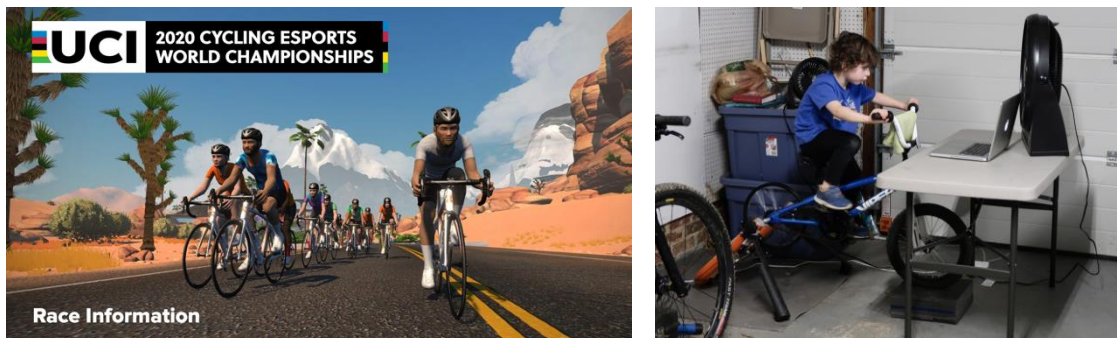


Figure 4.7 Cycling Esport

5. Understanding Bike Fit

Bicycles come in different shapes and sizes and have distinct characteristics that caters to each discipline's needs.

Road cycling bikes will have a lightweight frame, with skinny tyres, handlebars that curve back down underneath themselves, and carries a high gear ratio. Aerodynamics is also taken into consideration when manufacturers design these bikes.

Cyclocross bikes looks very similar to road bikes, but it comes with thin knobby tyres and with enough clearance space around the wheel for the tyres and mudguards.

Bikes for mountain biking have an even wider range of gear ratios to help traverse through mountains or across varying terrains. Tyres are usually knobby and wide for traction, and comes with only front suspension (hardtail), or both front and rear suspension (full suspension) or have no suspensions. The brakes, meanwhile, are designed to withstand the high temperatures of braking when going down a slope. This is vital to those traversing steep hills on trails. Disc brakes are often used to supply greater braking power and survive harsh conditions like mud, water, and extreme heat.

BMX bikes have handles that are able to spin in both directions as BMX is often used for tricks and stunts that require the handlebar to be like that. BMX bicycles use a special type of braking system that prevents the brake cable from becoming tangled in the bars. The brakes on BMX bikes are generally found only on the rear wheel and it has a system called V brake system which squeezes the tyre to slow it down and bring the bike to a stop.

Commuter bikes, or hybrid bikes are a mix between road and mountain bikes. They have flat handlebars, and some may come with a front suspension. They are designed with comfort in mind with the main use for commuting or leisure riding.



Figure 5.1 Example of a Commuter Bike

To understand one's bike fit, one must be able to identify the different parts of a standard bike. The standard bike consists of different parts like the saddle, seat post, top tube, spacers,

stem, brake hoods, brake, drop bars, down tube, forks, pedal, crank arm, chain stays. Most cyclists enquire, what is the perfect position to have the bike be. However, it all varies on the cyclist themselves and what they are looking for, like are they looking for power, comfort, aerodynamics or injury avoidance.



Figure 5.2 Parts of a Bike

One of the few ways to understand a better bike fit would be to test out the cyclist's physical flexibility. Hamstring and thoracic flexibility, as well as hip flexion are very vital for one's bike fit and will ultimately determine how upright a cyclist is set up. Thus, flexibility of a cyclist plays a key role in determining how their bike fit should be. The key tests for flexibility that can be carried out are reaching for your toes, straight leg raise while laying on your back and a hip restriction test (bringing up of knees to one's chest). Furthermore, more flexible riders will have an option to be positioned lower on their bike.



Figure 5.3 Hamstring and Thoracic Flexibility Test

Another way one can understand their bike fit would be by checking their body anomalies. Bikes are all perfectly symmetrical, however the human body tends not to be. For example, between the left and right sides, one may have a different height for their hip and shoulder,

or they may even have one leg slightly longer than the other. In addition, to attain better bike fit, one can be assessed by a bike fitter to ensure that the bike is comfortable for the user. For improved performance and reduced chance of injury, a bike fitter will ensure that the bike is as functionally symmetrical as possible.

Bike saddles are vital in the understanding of bike fit, as they are the holy grail for power in one's bike, it is also the most important cycle-position setting. Furthermore, the optimum saddle height recommended is when the leg is in a natural position, and when it is fully extended at the pedal stroke. Hence, if the saddle seat is too low, it will increase compressive force onto the kneecaps, which may cause pain and lead to an injury. In addition, the knowledge of joint angles plays a significant role in identifying one's bike fit. Joint angles are best expressed as the position a rider adopts to attain optimal performance. By joint angle, it simply means the angle of the bend of, say the knee. For example, a knee angle extension at the bottom dead centre to be around 35 degrees of a pedal stroke.



Figure 5.4 Ideal Saddle Height

Checking for Bike Fit (Example Using Road Bike)

- There should be about 2cm of standing clearance from the top tube to the groin.



Figure 5.5 Standing Clearance

- One should be able to bend elbows slightly while reaching for the handlebars.



Figure 5.6 Riding Position

- Check for saddle height settings. One should be able to reach the ground with both feet while rested on saddle.



Figure 5.7 Gage for Saddle Height

- Ensure that quick release has been tighten and secured, with 1 finger pressure. Check if you are able to turn the quick release lever in a clockwise direction (If yes then quick release is NOT secured).



Figure 5.8 Check Quick Release

- Double check quick release by lifting front/rear wheel and see if wheel falls out by lifting the bike and gently tap on the wheel to see if it drops out



Figure 5.9 Double Check Quick Release

- Final check by giving the wheel a spin and watch if brakes are rubbing or if wheel is not centred



Figure 5.10 Final Check Quick Release

Check on Tyre

- Daily check of tyre pressure
- Road Bikes 100 – 120 psi
- Mountain Bike 35 – 45 psi
- Use body weight

Tip: Put your weight on the tyre and watch the area that the tyre meets the road. There should not be more than 30% compression of the tyre sidewall.

Road Bikes 100 – 120 psi, Mountain Bike 35 – 45 psi. Adaptors are available from the bike shop if you are using the petrol station's pump. You would still require a high-pressure pump as all petrol stations will not go up to 100 psi.

Check on Brake

- Pull one brake at a time & check that it can lock each wheel.



Figure 5.11 Brake Check

Check Helmet Standards

- American ANSI Z80.4 / CPSC
- European Union EN 1078
- Australia & New Zealand AS/NZS 2063
- Do a quick visual inspection of the helmet, checking for any cracks/heavy dents that would affect the integrity of the helmet.
- Helmet must cover your forehead and it should be fitted snugly



Figure 5.12 Helmet Check

Tip: There must not be any pressure points from the helmet as this would lead to discomfort and/or headaches.



Figure 5.13 Helmet Pressure Point Check

6. Skills Test

6.1 Starting & Stopping

The first drill for the skill test would be where a cyclist learns how to start and stop the bike. It is a very key fundamental for every cyclist to understand how to start, stop, get on and get off the bike.

After watching a demonstration, a learner will be tasked to demonstrate the best way to start the take off for riding. Firstly, he/she has to straddle the bike with both feet on the ground, followed by raising either left or right pedal to the 10 o'clock position to help provide power, then place either left or right foot on the pedal, with the opposite foot on the ground, push off with either leg while standing on the raised pedals and always remember to keep both hands on the handle bar.

As for stopping, when applying pressure on the brake, learner needs to remember to apply pressure slowly, to ensure that the bike slows its speed until it comes to a complete stop. As the bike comes to a complete stop, learner can slide off the seat and take either the right or left foot off the pedal and ensure when the bike comes to a complete stop, one of the feet is in contact with the ground.

To further ensure that a learner's breaking method is correct, the following drill test can be executed. A learner will be required to pedal down a lane and proceed to the first stop line where he/she is to apply the brakes for a normal stop. He/she should complete the stop before reaching the second stop line.

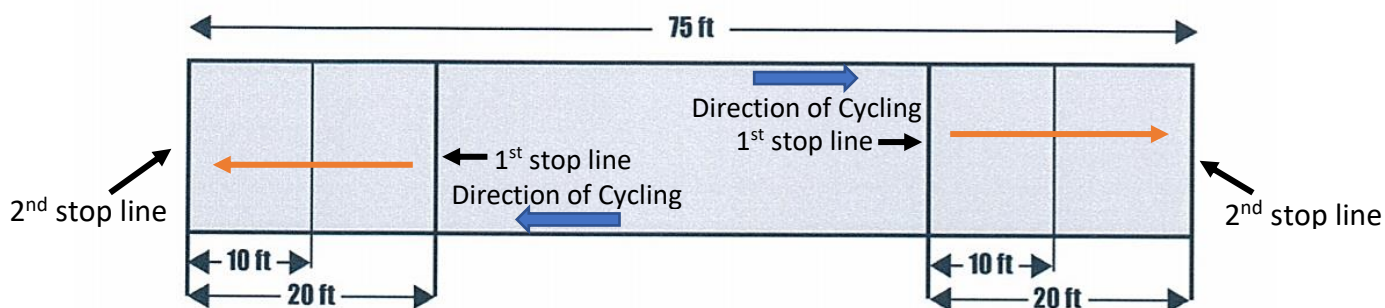
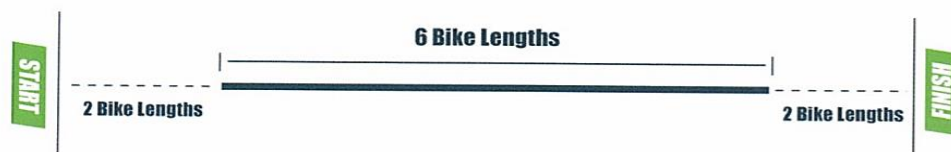


Figure 6.1 Stop Lines for Skill Test

6.2 Riding in a Straight Line

The second drill for the skill test would be to ride in straight a line, and it is called the straight-line drill. The course will be set up where there will be a white tape being passed on the floor, 20-30 feet long. They will have to ensure that their tyre is on the white tape when they are cycling. In addition, to make it harder for the participants, there will be cones set up in a triangular formation to ensure they ride through it. The objective of this test is to assess the learner's balancing while on a bicycle.

Straight line drill option 1



Straight line drill option 2

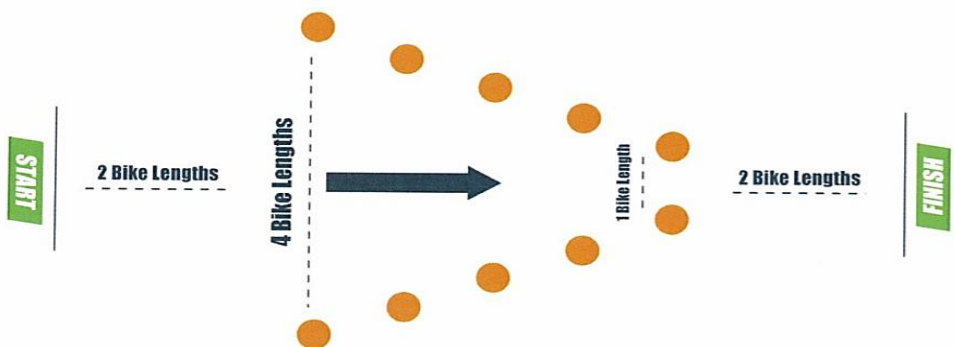


Figure 6.2 Straight Line Skill Test

6.3 Slalom Drill

The third drill is titled the Slalom drill. Where the cones will be set up four to six feet apart on the course. The main objective of the drill is for the learner to manoeuvre his/her bicycles left and right around the cones under control. Furthermore, the learning point from this drill is to ensure learners focus on their balance and manoeuvring of the bike. In addition, a variant of this drill is the Figure 8 drill. Where one cone will be placed two bike lengths ahead and one bike length to the right of the start line. The other cone will be placed two bike lengths in front of the first cone in a straight line. Tapes will be placed to guide the rider to follow the figure 8 position around the cones. The objective of the figure 8 drill is to test the balancing and manoeuvring of the rider, but also increasing the difficulty at the same time.



Figure 6.3 Figure of 8 Skill Test

7. Fundamental Movement Skills

7.1 Why Movement Skills Are Important for Children

Learning to move is crucial for a child's development and his/her optimal functioning. It helps the child to develop the necessary mobility skills for engagement in the physical environment around him/her.

Movement is the language of the body and mind operating in the physical environment. The human body is designed for movement. And children are free-spirited with natural urges to move, explore, experiment, discover, play and learn about their surroundings through their five senses. Movement is the means by which children navigate the physical environment, thus allowing them to learn about themselves and their physical surroundings in the process.

Movement and meaningful activities contribute to the holistic development of the child, promoting physical fitness, psychomotor development, creativity, self-esteem, self-confidence, learning and much more. Conversely, children with poor movement skills lack the confidence to explore new challenges in their environment, thus, short-changing themselves of further growth and development opportunities.

It is important to note that fundamental motor development provide the foundation upon which all other movement and sports skills are built. Positive early movement and play experiences can enhance the quality of a child's life, and influence decisions about lifelong recreational and sporting pursuits. Exposing a child to movement and related activities can bring him/her immerse benefits from being physically active and fit throughout their lifespan.



Figure 7.1 Happy Children Playing

7.2 Why Children Need Movement Skill Instruction

It is important to understand that children acquire many movement skills through proper instructions and a lot of practice. There are many movement skills (such as leaping, jumping, catching and kicking) that are rather complicated for children, especially younger ones. With proper instructions and appropriate practice opportunities, these movements can be 'programmed' in the brain for children to be able to fully perform them instinctively or automatically. At the auto-pilot stage, the brain is free from having to focus on the skill execution which allows the child to attend to other challenges, such as the changes in the dynamic environment and how to make appropriate decisions in response to it.

7.3 Understanding Children

When teaching children, it is vital to understand that each child grows at his/her own rate. Parents, teachers and coaches should not expect all children, despite their age similarity, to be able to do the same movement skill at the same competency level at any given time.

And children of the same age may not share the same interest and motivation for physical movement and related activities. It is important to make physical activities interesting and engaging for the child and to provide encouragement where needed.

One is also to note that a child is not a miniature adult with a similar skeletal structure, only smaller in size. As a guide, to help young children develop movement proficiency, it is better to plan gross motor activities to build good trunk control and balance first, before introducing finer activities that require skillful manipulation of hands, legs and feet.

7.4 What Are Fundamental Movement Skills?

Fundamental movement skills form the building blocks that underpin daily living activities (e.g. running in the rain, leaping over a puddle of water, or stretching to stop a cup from tipping over). In addition, movement skills, such as walking, running, jumping, catching and overhand throwing are the foundational base upon which all other sports and movement skills are built. For example, chasing the ball or running with it in basketball, soccer and hockey, are all different forms of the running skill, with variations in speed (fast or slow), and changes in direction.

Fundamental movement skills are generally categorised into three main themes: Locomotor, Object Control and Stability. Within each theme are key movement skills, with those deemed appropriate for young children listed in the table below.

<u>Locomotor</u>	<u>Object Control</u>	<u>Stability</u>
Walking	Throwing & Rolling (underarm & overarm)	Balancing
Running	Catching	Bending and curling
Leaping	Kicking and dribbling with foot	Turning
Jumping	Striking	Twisting
Sliding	Bouncing and dribbling with hand	Stretching
Galloping	Dribbling with long implement	Transferring weight
Hopping		
Skippping		

Table 7.1 Fundamental Movement Skills for Young Children

The sport of cycling can help with the development of some of these fundamental movement skills such as riding (like galloping), object control, balancing and transferring of weight.

7.5 Movement Concepts

For parents, teachers and coaches who are teaching young children, it is also important to understand that movement does not happen in isolation. There are important movement concepts that young children need to know and learn. Other than knowing what the body can do (body awareness), the child also needs to develop an awareness of effort, space and relationship.

Effort Awareness (How the body moves)	Space Awareness (Where the body move in space)	Relationship Awareness (With whom, what, which body parts does the body move)
Force : Strong/Light Time : Fast/Slow Flow : Bound (movement limited by boundaries, space, constraints) Free (no boundaries or constraints)	Locations : self-space, general space Directions : Forward/Backwards, Right/Left, Up/Down, Clockwise/Anti-clockwise Levels : Low, Medium, High Pathways : Straight, Curved, Zigzag	Of body parts : Round (curved)/Straight/Twisted, Narrow/Wide, Symmetrical/Asymmetrical With objects and/or with people : Over/Under, On/Off, Near/Far, Infront/Behind, Along/Through, Meeting/Parting, Surrounding, Alongside With people : Leaning/Following, Mirroring/Matching, Unison/Contrast, Between Groups, Solo/Partner/Groups/Alone in a mass

Table 7.2 Effort, Space, Relationship Awareness in Movement

Cycling can help build a child’s awareness in all three areas. The amount of force exerted on the pedals, the speed of peddling, maneuvering of the bicycle and self on cycling path/spaces can help a child build up effort awareness. Space awareness can be developed through cycling where a child is required to move their body in various directions to maintain balance and optimal posture, turning the handle bar clockwise/anti-clockwise and to keep himself/herself and his/her bicycle on a path, be it straight, curved or otherwise. In terms of relationship awareness, a child can learn through cycling how different parts of his/her body is performing different tasks to get the bicycle going. He/she will also learn to be aware of his/her body’s relationship to the bicycle. In additional, the child will also need to the aware of his/her relationship with other cyclists on the pathway, parks, etc.

7.6 Guiding Principles When Teaching Fundamental Movement Skills

Here are some guiding principles to help parents, teachers and coaches plan, design, and teach child-centered fundamental movement skill lessons that are fun, appropriate and challenging for young children.

Focus on Teaching the Child, Not on Teaching Activities

Understand the development and individual needs of the child. Plan and deliver developmentally-appropriate lessons by adapting style of instruction, equipment and activities to facilitate successful participation of all children. Introduce a variety of activities that match the child's ability, beginning with simple play and progressing to more challenging activities. For example, when the child is learning to catch, toss a light scarf before introducing medium or large soft toys, and finally, balls.

Avoid Over- or Under-Assistance

Adopt a structure that provides the minimal level of help that the child needs. Learn to 'fade' your level of assistance as the child's level of mastery increases. This allows the child's

independence and self-confidence to increase. Parents, teachers and coaches need to be observant of the child's skill level progression in order to do this well.



Figure 7.2 Providing Assistance When Needed

Use Short, Simple and Clear Verbal and Visual Cues

When communicating with young children, avoid abstract terms but use simple terms that they can understand. Wherever possible, make instructions 'visual' as it is easier for children to associate body movements with mental images of objects with which they are familiar and can related to.

Children Learn Best Doing, and Through Play and Stories, Not by Listening and Watching

Build in plenty of opportunities for children to have hands-on practice. Physically assist children to experience the correct movement if necessary. Involve them in purposeful and fun activities that develop specific skills.



Figure 7.3 Children Practicing Cycling

Allow Children to Have Choices in An Activity

Children differ physically in terms of physique and in strength even if they are of the same age group. It is important to give them the freedom to decide on the activities that they can participate in based on their own comfort level. Plan activities with different levels of complexity and encourage children to choose the level they would attempt, to ensure positive experiences. Once confident, they can be encouraged to move to the next level. For example, when creating a 'river' for leaping over, taper it from narrow to wide so the child can leap across at the point which he is comfortable.

Build Up Movement Skills Progressively

Breakdown movement skills into simpler parts where possible and allow children to learn one part of a skill at a time. Avoid information overload or introducing complex activities too early.

Plan for Maximum Participation with Minimum Waiting and Watching

Children are naturally active and energetic. Plan for children to work individually or in small groups, wherever possible, to minimise waiting time.

Provide Genuine, Appropriate, Specific and Positive Feedback ... and with A Smile

Go beyond feedback such as "Good job!". Elaborate your feedback with illustration, example, "You leaned your weight to the side that you want to turn to!". In an opposite scenario, avoid saying, "That was wrong, try harder!". Instead, say, "Good attempt, now let us try to remember to lean our weight to the side we want to turn to."

Help Children Develop the Spirit to Try Without Fear of Failure

Help children to develop the can-do spirit and allow them to make mistakes. Encourage a child's efforts and avoid ridicule.

Ensure That Children Play in a Safe and Conducive Environment

Do a simple risk assessment to ensure that the environment is safe for the child. Children must be able to play safely to enjoy positive physical activity experiences. Parents, teachers, coaches can consider and adopt the following safety rules:

- Make sure the play area is safe and free of hazards (e.g., broken glass bits, sharp protruding objects and potholes).
- Check and ensure that all equipment is in good working condition. Equipment with loose or damaged parts must be replaced immediately.
- Do not allow children to play near drains, uneven ground, car parks and by the roadside.
- Avoid using outdoor playgrounds during bad weather. Watch out for wet and slippery surfaces.
- Remind children to be patient and to wait for their turn for an activity.
- Remind children to hold on firmly with both hands on moving equipment/object .
- Keep children away from a moving equipment/object.
- Get children to learn to share play equipment and ensure no pushing and snatching.
- Children must always be supervised by parents or adults known to them. Remind them not to leave the play area with any strangers.

7.7 Observing Children

To help children progress from a new to a mature pattern of any movement skill, we need to observe them closely as they perform the skill. We also need to be aware of the common developmental movement difficulties experienced by young children and help them overcome these. Parents, teachers, coaches can adopt the two-step approach below when observing children's movements.

Step1

Full Body Movement Analysis

Observe the entire movement to have a general sense of how well the child is moving. Is the child moving proficiently or is he/she doing so in an awkward way? Is he/she confident or are there signs of anxiety? Are there key movement elements missing in the child's movement attempt?

Step2

Narrow Down to Segmental Analysis

Observe key body parts, one at a time, before, during, and after the movement. Take note of both intra-skill and inter-skill differences.

Intra-skill differences: Different developmental levels for different parts of the body in the same skill (e.g. mature level for the hands but transition level for the legs).

Inter-skill differences: Different developmental levels for different skills (e.g. mature level for running but initial level for striking with a bat).



Figure 7.4 Observing a Child Learning How to Cycle

Besides observing and analysing it is also important to assess a child's overall progress in the utilisation of the different movement skills. To assist parents, teachers, coaches in this process, the Observation Record and the Skill Proficiency templates below can be used.

Observation Record			
Name of Activity :		How to Play (Rules) :	
Date of Activity :			
Objectives :			
Space :			
Equipment :			
Set-up :		Variations of Play :	
Safety Considerations :			
Name of Observer :	Movement Skill 1 :	Movement Skill 2 :	Movement Skill 3 :
Name of Child :	Describe Assistance Needed		
Movement Skills + Concept Building Activities :			

Table 7.3 Observation Record and Skill Proficiency Template

8. Understanding Youth Athletes

8.1 Growth and Maturation

Young cyclists' developmental timetables cannot be accelerated, steps cannot be missed, and stages cannot be skipped. We must allow children and young people time to grow and mature. We must carefully cultivate the soil by developing physical competencies, then plant appropriate levels of training of the various physical capacities. Allow for those capacities to grow and develop and then carefully harvest them in competition. Age at onset of cycling also contributed to cycling skills. Hence, our results suggest cycling skills to be associated with physical and mental maturation.

8.2 Issues with Early Specialization

Overuse Injury

There is an increase of overuse injury in youths. The largest cause is young athletes specializing in one sport at an earlier age. Instead of playing, basketball or football, they are opting to stick with just one, and it takes a toll on their bodies.

Common overuse injuries:

- The knee is the most common kind of overuse injuries in cycling. Patellofemoral Syndrome (cyclist's knee), Patella and Quadriceps Tendinitis, Medial Plica Syndrome, and Iliotibial Band Friction Syndrome are a few of the more common knee overuse injuries. The first four injuries mentioned involve pain around the kneecap, while the last condition results in outer knee pain. Shoe implants, wedges beneath the shoes, and cleat positions may help prevent some overuse injuries.
- To prevent knee injuries, keep a lookout for:
 - If the pain is at the front of the knee, your saddle may be too low. It causes pressure on the patella
 - If the pain is behind the knee, your saddle may be too high. It causes your hamstring attachments to stretch
 - If the pain is at the side of your knees, your cleat set up may be incorrect, causing the knee to track incorrectly
- Fluctuating low back pain
- To prevent it, keep a lookout for this:
 - Position on the bike: if your position is very aggressive with a long stem/top tube and low handlebars, think about raising them to alleviate pressure
 - Position off the bike: if you work at a desk, think about your posture. Investing in a McKenzie pillow (round pillow that sits at your lower back and helps maintain good posture) is a good idea and you should also check your set-up isn't encouraging awkward twisting and that your chair is comfortable.
 - Core strength: if your core muscles are not strong enough, your lower back will collapse on the bike, causing undue strain. Working on your core

strength will also make you a more powerful rider, as your legs will push the pedals from a stronger base – so it's wins all round.

Avoiding Youth Sports Burnout

Sports are good for kids as it helps:

- Enhances social skills;
- Builds confidence, self-esteem, joy;
- Decreases obesity and increases health and fitness levels;
- Builds teamwork, sense of fair play and leadership;
- Provides valuable life lessons and healthy competition; and
- Begins physical activity habits that will follow a child into adulthood.



Figure 8.1 Burnout Youth

Thus, it is important to maintain a balance between studies and sports. Estimated 70% of children drop out of their sport by the age of 13 due to a physical, emotional and mental exhaustion toward life and sports. The main reason is a loss of enjoyment due to parental and coaching pressure as well as unrealistic expectations from adults.

Recommendations of how to avoid burnout

- Focus on wellness. This may include taking time off from specific training and competition, decreasing levels of mental and physical stress, and allowing for recovery.
- Keep sports fun, safe and enjoyable.
- Conduct age appropriate games/training, Basically, allow kids to be kids.

8.3 Motivation

A survey was conducted to determine if pressure, both from parents and peers, has an impact on participation in youth sports as well as the lasting impact on people throughout their lives. The most alarming finding is that the number of children participating in youth sports has declined 6% over the last five years, while participation in all sports is down 10%.

According to those surveyed, 38% of children are between ages 7 and 9 when they begin in youth sports, with 29% having started earlier. Organized sports only remained in the lives of the minority of those who answered, with 70% of children leaving organized sports by the time they are 13 years old.

Only 24% of respondents said they were never disciplined for poor performance. When asked who pressured them the most, 42% of those surveyed said it was coaches while 27% said friends and another 27% said parents (21% said Dad, 6% said Mom).

Having fun is essential to keep kids in sports.

- A study suggests that the idea of winning is overrated when it comes to determining whether kids are having fun playing sports.
- The study found that there were 81 “fun” factors, which ranged from sportsmanship, to team rituals to things such as medals or cool jerseys. The top-rated factors were not winning or getting medals as you would expect — but being a good sport, trying hard and positive coaching.

8.4 Nutrition and Hydration

Healthy Calories = More Energy

Calorie intake is crucial for the growth and development of young athletes. The calories we put in our body helps us function during practice or competitions so we can be at our peak performance.

Protein Aids in Muscle Recovery

After a workout, protein is essential for helping muscles recover. Exercise causes micro-tears in muscle fibres, which leads to sore muscles. Hence, protein is needed to facilitate muscle recovery after a workout (E.g. chicken, beef, eggs, fish).

Healthy Carbohydrates Add Fuel to the Fire

The recommended amount of carbs to feed your growing youth athlete is 3-4.5 grams per lb. of body weight. (Example of healthy carbs - Quinoa, Oats, Bananas, Sweet potatoes).

Healthy Fats Provide Vitamins and Minerals

- Fats are crucial for performance and health because they deliver vitamins, minerals, and nutrients to our well-tuned fighting bodies. They have higher calories than carbohydrates and protein. They also do not get depleted during exercise like proteins and carbs.
- Young athletes should consume around 65-85 grams of fat per day
- Example of healthy fats includes Avocados, nuts, tofu, fatty fish (salmon, herring, tuna, mackerel, sardines, trout).

Hydrate the Body for Optimal Performance

Expressing to your child the importance of water is crucial for their overall health. A good recommendation for every child is to drink at least a gallon (3.79ℓ) a day. When the hot months come, avoiding sodas, sports and energy drinks can save them from serious fatigue, dehydration, and heat exhaustion.

9. What Makes a Good Coach

9.1 Qualities of an Effective Youth Coach

Focus on Individual Performance Instead of Overall Results

Coaches should focus on the performances of individuals instead of overall results. A key indicator of development is performing. However performing does not equate to winning and overcoaching can have a negative influence. It gives the cyclist an opportunity to discover their qualities and growth which increases the level of engagement. By focusing on individual performances, coaches will know where to support improving cyclist's specific skills and guide them to have a deeper level of learning.

Communication

Communication is a key factor where coaches pass on their skills and knowledge depending on their ability to communicate with athletes. Communication is a two-way street that also involves receiving messages. Coaches need to be able to clearly communicate expectations, goals, standards and feelings to their cyclists in order to instruct, encourage, discipline and provide feedback. This means as a coach, listening attentively is important. Cyclists then need to be able to communicate their goals, frustrations and feelings to their coach which creates mutual understanding and a sense of identity and belonging.

Teaching

Teaching is where coaches impart their knowledge and experience to help cyclists learn and ultimately become more knowledgeable in cycling. It prepares the athletes for the activity and it presents the skills and techniques. It allows the coach to analyse, identify errors, correct inefficient or ineffective skills. Through that, it guides the coach to evaluate the effectiveness of the session and know how to improve.



Figure 9.1 Coach Giving Instruction to a Trainee

Planning and Organizing

This is where coaches oversee administrative matters and organizing of resources. Planning a training program helps with preparation, maximizing training sessions and achievement of training objectives. For administration matters, they include purchasing of equipment, collections of fees and working with National Sport Associations (NSAs).

Evaluating and Reflecting

Evaluation and reflection help a coach to know what needs improvement and helps compare current practice against an ideal set of practices. To conduct self-reflection, the creation of a systematic procedure helps to make effective comparisons. The quality of reflection will give the coach an idea of how to improve his coaching (training sessions) and athletes performances. The best time to reflect is after each training session to see if objectives have been met. Ways that this can be done is through mentoring or video analysis. For mentoring, someone whom a coach respects & selects can assist with the self-reflection process as well as audit a coach's interpretation of his or her own coaching practice. For video analysis, one can follow the procedure of recording > reflecting> consulting > planning > implementing > follow up recording.

9.2 Youth Coaching Philosophy

The Responsibility and Privilege of Coaching Youth Sports

“Coaching youth sports can be rewarding and meaningful because coaches can have an impact on these youths which can last a lifetime.



Figure 9.2 Coach as a Role Model

Coaching youth cyclists is not a waste of time, instead it is a privilege. A youth coach has the power to build or tear down a child's character, be the coach that sparked the love of the game for a future superstar athlete, set the bar for how a coach should interact with a player, show them what it is to be accountable to those who depend on you and also show the importance of physical activity and how fun it is staying active in life. As a coach, you also have the responsibility of teaching the cyclists sportsmanship in winning and losing, which will help them with handling success and failure in life.

Benefits of Coaching Youth Athletes

When done selflessly, coaching moulds better leaders, developing tools and characteristics that are transferable to the workplace.

Active listening is one of the most undeveloped skills available to us, yet critical in order to be mentally present and authentic in a conversation. Active listening is when the listener fully concentrates, understands, responds and then remembers what is being said. As a coach, active listening allows for a greater opportunity to connect with players, leading to more trusting and open conversations. This also allows for you to gather a better understanding of how a player may interpret something you have once talked about, allowing for a chance to work together and create a clearer path to your goals.

One of the most rewarding moments of coaching is allowing the athlete to figure something out on their own. Leading them with thoughtful questions and watching an inquisitive look

turn to one of confidence when everything suddenly makes sense, allowing the athlete to think deeper instead of giving them an answer straight. Athletes, like colleagues, will rarely excel when treated like a robot. There is an irrefutable difference between knowing how and understanding why, and the sense of empowerment comes along with the latter.

9.3 Transformational Coaching

Transformational coaching is similar to life coaching. It involves helping people to have a deeper realization of themselves better and their lives by having necessary changes. In simple terms, it is focused on enabling deeper self-realization. It is changing the way people see themselves instead of changing how they act.

Developing better people means developing better athletes. Coaches have a huge influence and impact on the athletes they coach, so setting an example by spreading positivity and teaching them values and trusting the process. It is important to treat them fairly but not equally, understand that they are individuals and try to be in their shoes to process their thoughts.

Transformational coaching represents a person-centred approach to coaching, and it leads to positive outcomes. There are four factors to it: idealized influence, intellectual stimulation, individualized consideration and inspirational motivation.

1. *Idealized Influence* - It occurs when coaches gain their athletes' respect and trust by treating them fairly and by modelling pro-social behaviours.

E.g. Coaches have the ability to influence others to want to be like them which can be expressed through a coach's willingness to take risks and follow a core set of values, and ethical principles. Through this, coaches build trust with their cyclists, in turn, develop confidence in their coach.

2. *Intellectual Stimulation* - It involves coaches to promote a learning environment in which athletes contribute new and alternative ideas.

E.g. Coaches involve cyclists in the decision-making process, which stimulates their efforts to be as creative and innovative. By doing this, it gives cyclists an opportunity to change the way they think, frame problems and overcome obstacles.

3. *Individualized Consideration* - It involves coaches that recognize their athletes' individual needs and abilities by displaying genuine care and concern.

E.g. Coaches customizing the training session which caters to the cyclist strength or weakness and areas where that can be improved. By doing this, it makes the athlete to grow and be pushed to their fullest potential.

4. *Inspirational Motivation* - It is generated when coaches hold high expectations and communicate a compelling vision of the future.

E.g. Coaches have the ability to inspire confidence, motivation and sense of purpose to their athletes so they need to articulate a vivid vision for the future and demonstrate a commitment to the goals being laid out. Coaches need to have continued enthusiasm, optimism and ability to point out the positive.

Coaching can promote positivity teaching and all of those mentioned above leads to positive outcomes such as athlete satisfaction, performance, cohesion and intrinsic motivation.

9.4 A Lifelong Learner

Being a coach does not mean that our learning stops there, in fact, we learn new things every day. Be it about our cyclists, new tactics or new rules, the learning never stops! Having a growth mindset in coaching is important, as it looks at coaching philosophy, coaching methods, and the systems and processes operating within sporting organisations, to ensure that all three are tuned in to growing a youth cyclist.

Applying a growth mindset in coaching does not mean removing competition, nor that we avoid selecting individuals. It does not mean we start believing that everyone can be the best in the world. These are some common misconceptions around the growth mindset message in sport. Instead, a growth mindset provides a framework for how best to focus responses to competition, a rationale for how to communicate selection, and an understanding of how to help people always improve and to go beyond their current best performance. In a growth mindset we do not know what the cyclist's potential is, or how good they could become.

Most coaches would put an exceptionally high price on mental toughness, especially at an elite level; however, this is often the area where most fixed beliefs are held. If coaches hold a fixed belief about any element of mental toughness, then their behaviour is likely to be about identifying this in cyclists, rather than teaching and developing it. Some people may have a fixed mindset about the behaviours that come from a growth mindset, believing that resilience, motivation, or determination are predetermined at birth.

The ten points below are a practical framework for coaches to use with their cyclists.

1. *Self-Awareness* – Helping the cyclist to discover, understand their own mindsets and behaviours.
2. *Teaching the Mindsets* – Helping cyclists to understand the behaviours, and the meaning behind winning or losing a competition.
3. *'YET'* – Communicating to people that it's not that they'll never achieve a goal, it's just that they haven't quite got there... yet.
4. *Role Models and Learning Journeys* – Using real life examples and stories to help people understand how goals are achieved whilst helping them understand their own journeys in learning.

5. *Malleable Intelligence and the Brain* – Educating people about the brain and its malleability (how one’s thinking can be moulded into believing something else) is significant in developing a growth mindset.
6. *The Learning Line, Risk, and Challenge* – Understanding how we learn, taking on challenges, and taking risks are vital in developing a growth mindset.
7. *Struggle, Failure, and Making Mistakes* – Making it explicit that failure and making mistakes are vital if we are to learn, improve, and ultimately be successful.
8. *Conscious and Unconscious minds* – Helping people understand about the conscious and unconscious minds are important for two reasons. First, when we are learning a skill, we are transferring it from our consciousness to our unconsciousness (muscle memory-knowing how to do a certain action by activating the right muscles) the more we practice.
9. *Effort, Praise and Feedback* – Adjusting our language and rewards to value the process of learning.
10. *Process is Primary* – Helping cyclists to focus on the things they can control (process goals) rather than the things they can't.

9.5 A Good Role Model

It is important for younger generations to have positive role models and someone to look up to in their lives. When making decisions or choices, their role models will be the example they use because they strive to emulate them and use them as their inspiration. Being a role model to a child is like a guidance of how to be the person they want to be in the future. Usually parents, teachers and coaches are role models to the youths because they look up to them and respect them. Actions speak louder than words, youth usually mimic what the adults do so the adults need to lead by example.

Decide What You Value

Before starting the new season, decide what sport means to you and what it has to offer. What it must teach the athletes about the world, themselves and their relationship with others. Many of the lessons and behaviours that they learn in sports influences them in the future.

Adopt Codes of Conduct

Setting the right tone from the start by adopting written codes of conduct for the athletes, parents, and coaches. Conducting a team meeting with the athletes to discuss expectations around conduct. Give each athlete a copy of their respective code of conduct, ask them to review it and sign it, and then collect them for safe keeping. As reference, circulate copies of the codes by email to everyone. Coaches can review their own “coach code of conduct” with athletes so they know what to expect.

Walk the Talk

As the training progresses, words and actions must be consistent with the coaches' stated values and own code of conduct. Make sure that coaches do what they say and remember that the cyclists are watching and are going to imitate the coach's actions. Be a model of integrity, not hypocrisy.

Reflection

Following each training session, and throughout, reflect on behaviour and speech around the athletes. Reflecting after training sessions what can be done better and make improvements to the coaching (training sessions) and athletes' performances. A coach should always reflect on themselves and find ways to improve themselves.

There is no definitive list of what makes a good role model. Coaches will need to show their athletes that they possess these qualities, and that they expect the same from them. Coaches are inevitably a role model to the athletes they are coaching, whether they like it or not, the athletes will look up to them and learn from them.

10. Effective Youth Coaching

10.1 Planning an Effective Age Appropriate Training Session

Achieving Positive Outcomes from Youth Sports

There are two important aspects of sports participation that affect positive youth development - intensity and balance. A combination of all offers the greatest benefits to youths.

1. Intensity

The amount of time cyclists spend doing the sport each week is important to whether they receive positive developmental outcomes. Those who spend more time in cycling have greater benefits than those who participate at lower levels or not at all. With greater time commitment, cyclists develop better mastery of skills with knowledge of tactics and strategy. The important learning is that youths who make a commitment to regular practice receive greater developmental benefits.

2. Balance

The most important of the two aspects of youth sports participation is to achieve a balance between sports and other activities. Greater developmental outcomes are attained by youths who spend time in activities other than their dominant sports pursuits. It is necessarily the number of activities in which youths participate, but rather that they have outlets beyond sports. Activities like volunteering in the communities, are some activities which youths can participate in, which presents real-world challenges, to help them achieve greater developmental benefits. Additionally, encouraging youths to develop a civic identity and to see the world beyond a game of competition.

How Much Should Cyclists be Training for Their Sport?

To help plan a cyclists training program without running into the risk of injuries and burnout, some guidelines were suggested:

- 1 hour per year of age per week
- 1 day off a week
- 1:2 ratio of free play vs organised sport

How Much Training Is Too Much?

Youths today are becoming very involved in sports at a young age, with many playing multiple sports teams per year. As much as wanting youths to be active and healthy, training too much could have a negative effect. Cyclists should not spend more hours than your age in training during a given week. Those who train for their sport for more hours than their age per week are more likely to incur serious overuse injuries than other types of injuries. With growing pressure to specialize at increasingly young ages, it is important that keeping an athlete healthy and injury-free far outweighs any perceived competitive advantage derived from excessive training.

10.2 Risk Assessment and Safety Management

Risk Assessment During a Cycling Coaching Session

Coaches have the ultimate responsibility to reduce the risks of participation for athletes involved in the sport that they are coaching.

To conduct a safe program or session for the cyclists, coach should identify the:

- **Facilities, Equipment and Activities Involved:**
 - When conducting a cycling training, it is necessary to identify the facilities and equipment that will be used that will create risks to participants.
- **Hazards Associated with These Facilities, Equipment and Activities:**
 - The range of hazards encountered can vary widely across sports. (Hazards specifically on cycling).
 - It is important to appreciate that some hazards will only exist at certain events, such as the presence of large crowds at major events and vehicular traffic during events on public roads (during a cycling competition).
- **People Directly or Indirectly Affected by These Hazards:**
 - All personnel who may be affected by each hazard should be identified.
 - Safety issues related to ways in which participants or members of the public may be affected by the facilities, equipment and activities should also be identified. (any proper place which cyclist should/ should not be cycling).
- **Levels of Risk Experienced by Those Individuals Exposed to the Hazards:**
 - A procedure for estimating and evaluating risk should be established and should be used consistently across the sport. The procedure should be simple, understandable and effective for estimating and evaluating the risk across the entire hazards, situations and people.
- **Measures Required to Reduce the Risk to Acceptable Levels:**
 - The assessment of potential consequences should include the impact on both people and property. The evaluation of whether the level of risk is acceptable or not is determined by considering a combination of the probability that the adverse event will take place and the magnitude of potential consequences.

Sport Safety Management

How does a coach conduct a sports program safely? Preventing injuries to cyclists is a primary risk management objective. Below are some guidelines and techniques to reduce the risk of injuries to cyclists.

Isolate the hazard around the training perimeter as shown in hierarchy controls

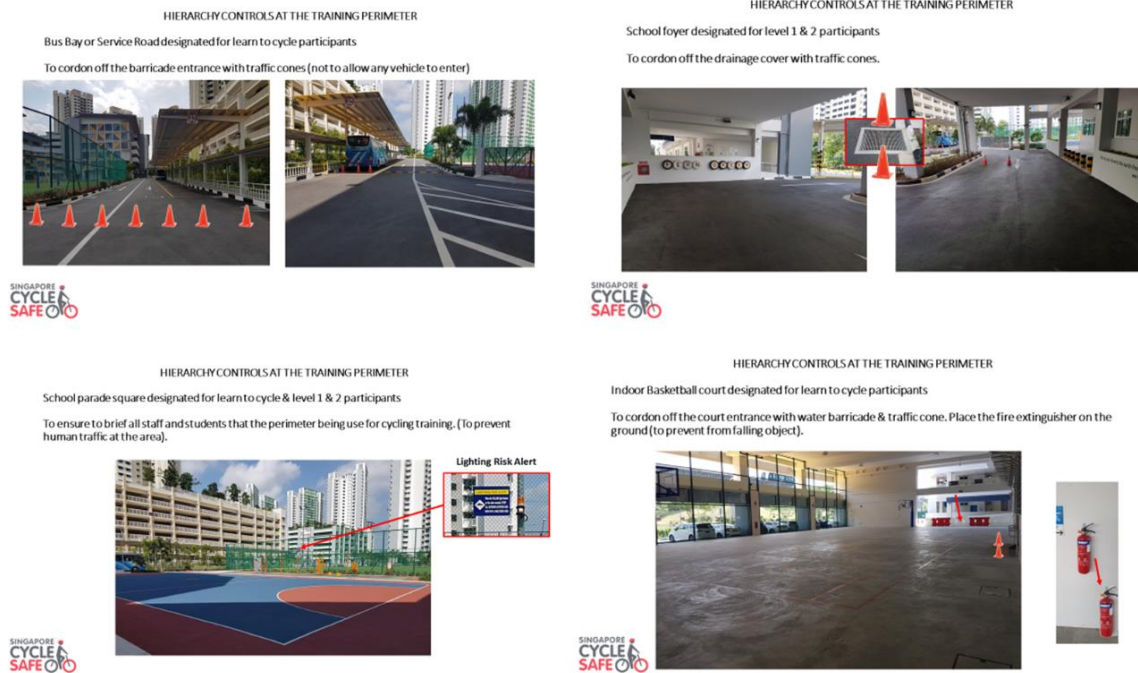


Figure 10.1 Risk Assessment Before Training

- a) Preparation
Providing proper planning for each step of cycling training and competition.
- b) Environment
Select an appropriate training venue for the cyclists and to use proper equipment.
- c) Instruction and Competition
Ensuring appropriate sport skills instruction for training and competition.
- d) Athlete Group Composition
Match athletes to strength, size and ability.
- e) Athlete Assessment
Continually assessing each cyclist for participation in appropriate activities within his/her ability.
- f) Inherent Dangers
Informing athletes of inherent risks associated with cycling (such as cycling on a busy road with oncoming vehicles)
- g) Emergency Action Plan
Establishing and using an emergency action plan that includes: procedures for emergency medical support, communication, incident and accident reporting.

h) Medical assistance

Medical support is to be provided at all times during a cycling training. Given that cyclists will be training on the road with vehicles, it imposes a greater risk for this activity, thus, the higher level of medical support is required.

10.3 Talent Identification and Development

Cycling Talent identification

1. Physical Suitability

Some sports will require athletes to be small to be advantageous while some will require the athlete to be strong. Cyclists physical attributes are important for performance aspects such as speed, effort and energy expenditure. Collection of data such as their height (cm), weight (kg) and body fat (%), will be beneficial when determining the suitability of individuals when it comes to an elite level of cycling. Weight is important in cycling because the more or less a cyclist weighs, the more or less energy it will take to pedal their bike.

2. Fitness Tests

Depending on the category (Endurance or sprint cycling) the cyclist is interested in, tests will be conducted to see how suitable they are in the different categories. These tests include: Standing height, Body mass, 2km cycle time trial (for endurance cycling) and 40m cycle sprint (for sprint cycling).

Even if a cyclist has the physical attributes in a discipline, their potential to succeed also depends on other factors such as motivation, commitment and determination.

10.4 Understanding Long-Term Athlete Development

The Long-Term Development of athletes consists of a series of stages for growth and development. Within each stage, it is important that training and competition are designed appropriately to cater to the developmental requirements at that stage. Only by following age-appropriate activities and building a foundation in each stage for the next can athletes optimally prepare to progress towards their goals. Refer to the tables below for the different stages of development.

Physical	<ul style="list-style-type: none"> • Movement literacy • Focus on learning proper movement skills (running, jumping, wheeling, twisting, kicking, throwing and catching) • Fundamental movement skill development • Speed, power and endurance through FUN and games • Anaerobic power: children have limited capacity • Aerobic power: incidental development through fun and games
Motor & Mental	<ul style="list-style-type: none"> • Motor learning integrated into games • Focus on motivating and FUN activities • Emphasize trying new activities
Tactical	<ul style="list-style-type: none"> • No tactics in this stage
Technical	<ul style="list-style-type: none"> • Exploration of risk and limits in safe environments • Active movement environment combined with well-structured gymnastics and swimming programs mid- to late-stage • Learn to ride a bicycle

Table 10.1 Active Start: Learning to Ride (Age 0-6)

Physical	<ul style="list-style-type: none"> • Movement literacy • Fundamental movement skill development • Speed, power and endurance through FUN and games • Strength: Introduce to core strength and stability through fun games • Warm up/ cool down: intro to concept • Anaerobic power: Athletes have limited capacity • Aerobic power: incidental development through fun and games
Motor & Mental	<ul style="list-style-type: none"> • Motor learning integrated into practices • Focus on motivating and FUN activities • Emphasize effort, doing one's best, finishing
Tactical	<ul style="list-style-type: none"> • Basic BMX tactics • Basic concepts of racing: mass-start, time trial etc • Introduction to basic sport rules, tactics and ethics
Technical	<ul style="list-style-type: none"> • Introduce and develop basic cycling skills • Introduce BMX racing skills • Intro position and pedal stroke with 2 wheels, use of gears, basics of cornering, climbing, descending, braking, accelerating, avoiding obstacles

Table 10.2 Fundamentals (Ages 6 -9)

<p>Physical</p>	<ul style="list-style-type: none"> • Building engine-major fitness development • Advanced sport specific drills • Speed, power: Intro to plyometrics • Strength: Key development window for females at onset of menarche. Continue core strength and stability, diagnose for ankle and knee stability, intro free weights • Warm up/cool down - athletic specific routine • Anaerobic power: Emphasis in competition phase only • Aerobic power: Emphasize via specific training and complementary sports
<p>Motor & Mental</p>	<ul style="list-style-type: none"> • Motor learning integrated into practises • Develop mental preparation ; appropriate attitude to competition, being the best you can be, belief in process • Profile mental qualities • Incorporate cross training
<p>Tactical</p>	<ul style="list-style-type: none"> • Specific BMX tactics • Introduction to bicycle racing (other disciplines) • Introduction to sports rules, tactics and ethics
<p>Technical</p>	<ul style="list-style-type: none"> • Develop advanced cycling skills • Introduce group riding, drafting, pacing • Rules and ethics

Table 10.3 Learn to Train (Ages 8-12)

<p>Physical</p>	<ul style="list-style-type: none"> • Building engine-major fitness development • Advanced sport specific drills • Speed, power: Intro to plyometrics • Strength: Key development window for females at onset of menarche. Continue core strength and stability, diagnose for ankle and knee stability, intro free weights • Warm up/cool down - athletic specific routine • Anaerobic power: Emphasis in competition phase only • Aerobic power: Emphasize via specific training and complementary sports
<p>Motor & Mental</p>	<ul style="list-style-type: none"> • Motor learning integrated into practises • Develop mental preparation; appropriate attitude to competition, being the best you can be, belief in process • Profile mental qualities • Incorporate cross training
<p>Tactical</p>	<ul style="list-style-type: none"> • Specific BMX tactics • Introduction to bicycle racing (other disciplines) • Introduction to sports rules, tactics and ethics
<p>Technical</p>	<ul style="list-style-type: none"> • Develop advanced cycling skills • Introduce group riding, drafting, pacing • Rules and ethics

Table 10.4 Train to Train (Ages 11-16)

<p>Physical</p>	<ul style="list-style-type: none"> • Optimizing the engine • Advanced sport specific drills • Speed, power: Develop plyometrics, specific sprint training • Strength: Athlete specific core strength and stability, ankle and knee stability, free weights. Sport specific strength in specific preparation phase • Warm up/cool down- integral, specific to training and competition • Anaerobic power: specific prep and competition phases, targeted development • Aerobic power: Specific training and complementary sports
<p>Motor & Mental</p>	<ul style="list-style-type: none"> • Decision making • Refine mental preparation • Social psychology and team dynamics
<p>Tactical</p>	<ul style="list-style-type: none"> • Refine competition skills and test various strategies • Develop team event tactics • Continue sport rules, tactics and ethics
<p>Technical</p>	<ul style="list-style-type: none"> • Refine advanced cycling skills • Experiment with techniques: cornering, single track, group riding, drafting, pacing etc

Table 10.5 Learn to Compete (Age 15-18)

Physical	<ul style="list-style-type: none"> • Optimizing the engine • Advanced sport specific drills • Speed, power: Develop plyometrics, specific sprint training, max power • Strength: Athlete specific core strength and stability, ankle and knee stability, free weights. Develop sport specific strength • Warm up/cool down- integral, specific to training and competition • Anaerobic power: periodized, targeted development • Aerobic power: Develop pre-season, maintain during season
Motor & Mental	<ul style="list-style-type: none"> • Decision making • Refine mental preparation • Distraction management • Social psychology and team dynamics
Tactical	<ul style="list-style-type: none"> • Optimize competition skills and test various strategies in competition • Develop team event tactics; select competitions for development purposes • Continue sport rules, tactics and ethics
Technical	<ul style="list-style-type: none"> • Refine advanced skills • Master techniques: cornering, single track, group riding, drafting, pacing etc

Table 10.6 Train to Compete (Age 17 - 23)

10.5 SCF's Athlete Development Pathway – Foundation, Development, Excellence and Sustainability (FDES) Model

The SCF's Athlete Development Pathway (FDES Model) incorporates the SCF Academy Programme as a progressive multi-year long programme for primary and secondary school students. Through this programme, technically gifted students and those with the appropriate physiological attributes will be invited to train as part of a national development squad for higher-level competitions. At a strategic level, the programme also serves a greater purpose:

- It is in line with the nation's call for school going children and youth to be exposed to organised outdoor and adventure type activities;
- Added opportunity to keep our kids "off the streets" and being engaged in an organised and healthy activity;
- Students will learn resilience and build bonds and friendships outside of school; and
- It is a progressive, 4-year programme.

On top of that, these are the benefits that students can gain from the programme:

- Learn a life skill;
- Pick up a new sport which they can carry to adulthood;
- Become healthier, fitter, stronger and more confident young adults;

- Learn basic bike maintenance skills and how bike parts work;
- Physics behind speed and cadence;
- Basic biomechanics (relationship between the body and bike to optimize performance); and
- Physical preparation (warm-up, cool down, importance of hydration).

Refer to **Annex 3** for Stages of Athlete Progression (Foundation & Development).

10.6 Instilling a Growth Mindset in Youth Athletes

1. Create a Starting Point

To establish a growth mindset in youth athletes, they must believe that they can get better by learning new skills and practicing, and that their improvement will be valued. In order to measure this progress, coaches can do skills assessment at the beginning of a season to create a starting point. Subsequently down the road coaches can conduct another skill assessment to gauge how much the athlete has improved. This would give athletes a goal and motivation to improve their skill set.

2. Create a Roadmap

Personal improvement is the best way to increase an athlete's chance of winning, so it's important to help each athlete identify the skills and abilities he or she wants to improve. By doing this, athletes can also achieve success irrespective of wins and losses. Identifying skills also helps athletes set a clear target to work on.

3. Guided Self-Reflection

Conducting a self-reflection at the end of a training session or session helps athletes to clearly see the goals they've established. This helps athletes to learn more about their strength and weakness which promotes personal developmental growth. Some examples of guided reflection questions that athletes can use include:

- What are you most proud of from the season?
- What could you have done differently?
- When things were difficult, how did you use the resources available to you?
- What skill or ability do you want to work on before the next season?

Journaling is another excellent way for young athletes to establish a reflective practice because they learn to review activities and important moments on a regular basis. It also creates a multi-season or multi-year record athletes can reference to reflect on their long-term progress.

10.7 Communications

Effective communication is essential in all aspects of life and just as important to be a successful coach or athlete. Coaches must be thoughtful not only in sending clear and understandable messages, but also in listening to and understanding what their athletes are communicating in return. This is important as how you communicate with your athletes directly affects how they perceive you and in return, how they feel about themselves. These are the five things coaches can do to enhance communication with athletes.

1. Listen

Some of the best coaches in the world are not only effective speakers and teachers but are also great listeners. They understand how an athlete feels physically as well as emotionally. Over 70 percent of communication is non-verbal. That means your body positions gestures, expressions and actions are just as important if not more than what you say. As coaches, you must understand how non-verbal communication, such as eye contact, posture and body language can impact athletes.

2. Build Trust from Day One

It is important for coaches to build trust with their athletes from the moment they step into the gym or on the field. Once you have developed a positive relationship with your athletes, you will see benefits in their attitude, teamwork and performance. A positive playing environment allows athletes to be supportive of one another and keeps them motivated toward a common goal. An abuse of trust, especially towards youths, can potentially cause long-term harm towards the relationship between coaches and athletes which will affect the progress and development of athletes. As such, it is important for a coach to build trust with athletes.

3. Understand Who You Are Coaching

Athletes will appreciate that you understand what their goals are and what matters most to them. When you are "speaking their language," your message will become a lot clearer in the picture you are painting for them. Coaches need to be able to explain everything at a level understandable to their players to maximise improvement. For example, different athletes can be different types of learners such as auditory, visual, verbal, kinesthetics, social or solitary. Knowing what type of learner your athlete is will greatly help them to understand whatever you are coaching.

4. Shift the Focus to Getting Better, Rather Than Being Good

If you are focused on the process of getting better, you become more resilient to both successes and failures, which shift from being individual events to the process on the path of progression. "Good" has an end point. "Better" is constantly making us adjust to the events along the way. "Good" looks to events past, while "better" looks to what is ahead of us. It is important to be grateful for what your athletes achieve along the way! Not only this will help you reach your goals but also enjoy the process.

5. Communicate Your Values

The coaching staff and its athletes should have a firm understanding and more importantly, a belief in the values of the program. These values set the tone and foundation of the program's culture. When everyone understands the values of a program, it will help reinforce why certain objectives were set and how they are going to get accomplished. Value will give you a clearer purpose on what cycling demands and allows athletes to decide on whether cycling is suitable for them.

Character Development Through Sports

Sports have been used since ancient Greek time to build character. In order to be good in a sport, one often needs to spend numerous hours practicing a skill. This requires discipline, focus and determination, just to name a few characteristics.

In the competition arena, athletes are often required to push themselves beyond their comfort level, overcome setback, pick themselves up again and again in order to achieve breakthroughs. These athletes often need to persevere and be mentally tough to bounce back from any obstacles or challenges. Out of these tough situations arise a resilient individual.

Sports also teach an individual about sportsmanship, team work and leadership amongst other characteristics, some of which were mentioned above. Sports also teach individuals goal setting skills which can be used in other areas of their lives.

Goal Setting

The goal setting process enhances performance levels for all areas, not just athletes. The main aim of goal setting focuses on increasing individuals' motivational levels to achieve success by directing attention and applying energy levels into achieving the overall goal. A cyclist without a goal is like a kid without a dream. Goals provide motivation and focus.

The use of SMART goals is an effective way to use the goal setting technique within any environment. The acronym broken down stands for Specific, Measurable, Achievable, Realistic and Time. The illustration below sets out how to create S.M.A.R.T goals:

S- Specific

The first standard for goals should be to make them specific. Instead of just saying want to make improvements, one might target a specific aspect of their riding. Instead of stating they want to ride further, they can include the distance covered as well.

M- Measurable

Cyclists should be able to measure their progress. If not, they would not know how close they are to achieving it. By measuring the goal cyclists can stay motivated on their journey to achieve it.

A- Attainable

Goals should be in one's reach. This does not mean "easy". If cyclists don't have to work for it, they would not get the feeling of achievement they are looking for. Goals need to challenge them to initiate change

R- Realistic

A successful goal needs to be realistic. A good assessment of a cyclist 's present situation will help them determine what a realistic goal might be. They should consider their work schedule, family needs, current commitments and present fitness while setting goals.

T- Time Bound

Cyclists should set a time frame by which they should achieve their goal. If they do not set themselves a time to do so, they can be demotivated and make excuses as to when they want to achieve their goal.

Here is an example of a S.M.A.R.T Goal

"I will complete 20km in under 40 minutes by 31st January 2021"

Based on the example, it has met the S.M.A.R.T criteria. Firstly, it is specific in terms of the distance covered and the time taken. Secondly, we can measure the distance and time to achieve this goal. Thirdly, the goal is not too easy nor difficult. However, it may vary from individuals and it is realistic. Lastly, there is a timeline to achieve this goal.

11. Physical Preparation in Cycling

11.1 Basic Energy Systems

There are three main energy systems that enable a person to cycle— aerobic, anaerobic, and neuromuscular. ATP or adenosine triphosphate is a molecule that your cells use for energy and it is produced by mitochondria in the cells, ATP releases stored energy that fuels the body. The more ATP your body can produce, the greater your cycling performance. Each energy system produces ATP differently based on quickly the cells needs energy. These energy systems can be trained which will affect the body positively by producing ATP efficiently and effectively.

Aerobic Energy System

The aerobic energy system provides most of the body’s ATP however it is the slowest in producing ATP but can do so for a long time. Our body produces ATP using oxygen and either glucose or fatty acids. When cycling, the aerobic system is the main power producer to the point that your cardiovascular system cannot utilize any more oxygen (VO2 Max). In terms of the cycling power zones which is the spectrum of cycling intensities, this includes active recovery, endurance, tempo, sweet spot, and threshold.

Anaerobic Energy System

The anaerobic energy system produces ATP quickly and rapidly as compared to the aerobic energy system. Unlike the aerobic energy system, the anaerobic system does not require any oxygen to produce ATP. This system is the main power producer for intense efforts which last around thirty seconds to around three minutes. In the Anaerobic energy system, your body converts glucose into ATP and pyruvate. Pyruvate is then converted into ATP or lactate. During a ride, you begin to use the anaerobic energy system anytime you go over your Functional Threshold Power which is used to determine your current cycling performance. Usually, you can feel when your anaerobic system is working hard when you feel the burning sensation in the working muscles.

Neuromuscular Energy System

This energy system uses creatine phosphate to produce ATP quickly and does it anaerobically. This energy system powers maximal efforts lasting less than fifteen seconds. The neuromuscular energy system is what fuels your max sprint power and short bursts. While this system produces energy quickly, it requires extended periods of recovery. This is the reason why you must rest in between sprint efforts to allow your body to recover before utilising the neuromuscular energy system again.

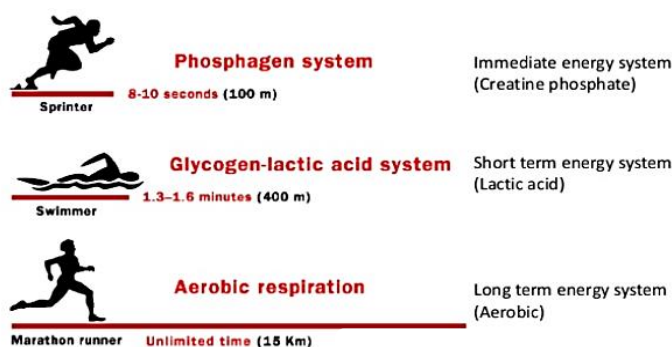


Figure 11.1 Three Energy Systems

11.2 Training with Power

There are three things to look out for if an individual wish to increase their power. These 3 things are their base fitness, aerobic fitness, and race power.

Base Fitness

This concerns an individual's ability to cruise in comfort and at a decent power output using fat as the main fuel to conserve glycogen for harder efforts. Riding in an individual's base training zone and progressively increasing the power and speed while still remaining within the zone can help improve base fitness. To benefit an individual's base fitness, the load must be high enough to elicit a training effect without being difficult as to take them above the base zone. Which also means that they are working relatively throughout their ride. To simply gauge, individuals should be able to hold conversations and chat while riding.

Aerobic Fitness

Individuals are required to have good power output at mid-range efforts alongside at base fitness levels. Developing aerobic fitness will permit individuals to sustain a higher percentage of their maximal power for a longer duration without excessive fatigue. It is also important that training remains within the desired zones for the individuals to benefit the most out of the training. Individuals should aim to keep their power output constant as it will help to improve their sustainable power and they would not be at risk of overexerting themselves.

Race Power

Short distance racing that are around an hour or so, is usually conducted at 85% or more of maximal power. Improving the power at this point is the key to a fast bike leg. Top-end training will provide good power gains relative to the time spent on training. Short, hard and fast interval sessions would be vital, including fast-paced hill work. The focus should always be on speed.

Improving power sessions			
Increase your power in all zones from bottom up and you'll soon be setting a new personal best			
	Base	Aerobic	Race
Session	Stamina-based on the road	Moderately hard indoor turbo effort	Race pace
Duration	2-4hrs	60-90mins	60-90mins
When	Winter/spring	Early/mid race season	Race season only
Aim	Improve your cruising power so that you can ride faster more easily	Improve your sustainable aerobic power at sub-lactate threshold effort	Improve top-end race power and speed
Content	Steady riding – not too hard but not too easy – over rolling terrain, but easing back on the hills	Warm-up, then ride for 5mins in a high gear with low cadence (70-75rpm) to improve strength. Then, ride for 5mins in a low gear with high cadence (95-100rpm) to improve speed. Repeat for 20-30mins, rest for 5mins and then repeat for another 20-30mins. Each strength/speed effort should be at the same speed/power output	After a thorough warm-up, do 1min fast and hard followed by 1min very easy recovery and repeat five times. Take 5mins to recover before starting another set of five efforts. Aim to do 3-5 sets in total
Monitoring	Conversation possible (mainly short sentences). HR or power in level 1-3 (65-80% max HR)	Your effort should be hard but manageable, similar to an Ironman 70.3/50-mile time trial effort. HR zone 3 (73-80% max HR/Power mid level 2)	Each effort should be at the same power output (approx effort for a sprint tri leg or 10-mile time trial) and slightly above your lactate threshold. Use rate of perceived effort if you don't have a power meter
Technique drills	Keeping comfortable on the bike with your upper body relaxed and still; cadence around 80-90rpm (70+ plus on hills). Practise eating and drinking on the bike	Focus on a strong leg extension without stomping and keep your upper body relaxed and still. During the speed efforts aim for a fast, fluid leg action that doesn't cause your upper body to bob	Practise riding at speed in your aero position, keep your cadence around 90-95rpm and ensure your pedalling is fluid and your upper body stays relaxed and still

Table 11.1 Cycling Training Zones

12. Yearly Planning Instrument (YPI) (Advance)

Structured training, in its most effective form, is both periodized and progressive. To get faster, your hard work needs to stimulate specific, physiological adaptations. Training periodization divides your season into distinct phases so that your hard work pays off.

Stimulus – Recovery – Adaptation

Fundamental to endurance training is the repetition of stimulus, recovery, and adaptation. Managing this cycle yearly, monthly, and weekly, is the purpose of periodized training. Structured training plans aim to add just enough stress so as not to be utterly overwhelming while providing adequate rest that drives physiological changes. Additionally, a training plan should progressively focus on particular types of fitness adaptations, built upon more general forms of fitness. Over the course of a training plan, you will eventually bring your fitness to a well-timed peak level.

Refer to **Appendix 4** for the Yearly Planning Instrument Sample Template and Guide.

12.1 Periodized Training and Peak Fitness

If the purpose of periodized training is to manage the cycles of stress, recovery, and adaptation, then its goal is to bring about a peak in fitness just in time for your event. Peak fitness is the culmination of an increasingly progressive and specific stimulus. The reason you want to reach a peak is that more stress is unlikely to elicit further positive adaptation, and training will level off and plateau.

Peak fitness is preceded by a taper in which you reduce the total amount of training stimulus that encourages freshness. The goal of a taper is to minimize the adverse physiological and psychological stresses of daily training to optimize your performance. While it is impossible to maintain a fitness peak indefinitely, you can hold it for several weeks.

12.2 Periodized Training Cycles

In periodized training, there are three cycles, macro, meso, and micro — each one corresponding to a shorter timeframe. Let's take a look at examples of each.

Macrocycle

The macrocycle is your seasonal training plan. It begins with the start of your training and ends with your goal event. In a traditional plan, the macrocycle is a year long. Throughout a macrocycle, you will see the progressive addition of training stimulus and the necessary recovery to drive aerobic adaptations.

Base, Build and Speciality

When considering the macrocycle, there is more to it than just adding training stress. Macrocycles need to include different phases that address base fitness and then drive towards more specific fitness. By following a logical pattern, each phase ultimately leads to a particular set of adaptations upon which peak fitness is balanced. These progressive phases are Base, Build, and Specialty phases. The macrocycle encompasses the entire season and all three progressive phases.

Mesocycles

Mesocycles are four to six-week blocks within the macrocycle and are typically referred to as blocks. In a typical four-week block, the first three weeks progressively overload your body, while the fourth week focuses on recovery. Each new week within a mesocycle sees a slight increase in the overall amount of stress (TSS), while each workout sees a similar bump in the amount of work demanded. This is done by more or longer intervals.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	1 Hypertrophy Weight Training	2 Watt Bike Program (Endurance Intervals)	3 Endurance Ride	4 BMX Skills / MTB Skills	5 BMX Skills / MTB Skills	6 Rest Day
7 Rest Day	8 Explosive Power	9 Watt Bike Program (Sprint Intervals)	10 Endurance Run	11 BMX Skills / MTB Skills	12 BMX Skills / MTB Skills	13 Rest Day
14 Rest Day	15 Q4 Physical Assessment	16 Q4 Power Profiling	17 Rest	18 BMX Skills / MTB Skills	19 BMX Skills / MTB Skills	20 Transition Period Start
21 Transition Period	22 Transition Period	23 Transition Period	24 Transition Period	25 Transition Period	26 Transition Period	27 Transition Period
28 Transition Period	29 Transition Period	30 Transition Period	31 Transition Period	1 Jan 2022 Transition Period	2 Jan 2022 Transition Period	3 Jan 2022 Transition Period End

Table 12.1 Example of a Mesocycle Training Program

Source : Singapore Cycling Federation

Microcycles

Microcycles are the simplest of the three training cycles. A microcycle is a single week within a training plan. Although workouts will vary from day to day, the microcycle includes the rhythm and cadence of a training plan.

For example, each week or microcycle has a familiar tempo. Tuesday, Thursday, and Sunday workouts are Sweet Spot, while each Wednesday is an endurance ride. Saturdays focus on threshold work, while Mondays and Fridays are reserved for rest. Athletes can customize the days they train when they build their training plan, but this is the standard structure.

	Description	Venue	Time	Training hrs
Monday	Rest Day			
Tuesday	Speed and Agility/Explosive Power/Hypertrophy	ABC	4.30 – 6pm pm – 7.30pm	1.5
Wednesday	Power Profiling	ABC	5.00 – 7.00pm	2
Thursday	Endurance Ride/Run		Own Time	2
Friday	BMX/MTB Specific Skills	Cycling Academy	4.00 – 6.00pm	2
Saturday	BMX/MTB Specific Skills	Cycling Academy	9.00 – 11.00am	2
Sunday	Rest Day			
Total Training Hours	9.5Hrs			

Table 12.2 Example of a Microcycle Training Program

Source : Singapore Cycling Federation

12.3 Progressive Training Phases

Every mesocycle in a training plan is linked to one of the progressive training phases – Base, Build, or Speciality. All three combine to form a macrocycle. These phases, completed in order, aim to drive adaptations in both the general fitness and the specific fitness needed for your event.

Base Phase

Becoming a faster cyclist begins with a foundation. You cannot build your higher-level endurance and power without establishing a foundation of strength and aerobic endurance first. Your first step in a training plan is to create that foundation in what is known as the Base Phase.

There are two ways in which you can complete the base phase. The first is high-volume training that is focused on low intensities. This requires upwards of 10-20 hours per week at a minimum. The second is a much more time-efficient method with less volume, but higher intensities called Sweet Spot. Using Sweet Spot Base you can achieve adaptations in as little as 5 hours a week.

Build Phase

During the second phase of training, the Build Phase, each type of workout takes on a more event-specific look. Greater emphasis is placed on escalating the weekly stress load via workouts that are more event-specific than the Base phase.

The intent is to improve more pertinent types of fitness while maintaining more basic forms of fitness. If you're not training for a specific event, you can view this phase of training as the one in which the intent is to grow your functional threshold power (FTP) the most.

Not only does the Build Phase allow athletes to heighten their level of training specificity, but it also brings their fitness to a point where middle-priority events can start to factor into their weekly training.

The Build Phase is focused on strengthening the specific power demands you will need on race day. Build Phases are focused either on Short Power, Sustained Power, or a mix of the two in General Build. There are specific Build Phases for each triathlon distance as well.

Specialty Phase

In the Specialty Phase, the overall stress load declines slightly to restore a higher level of race preparedness. At the same time, the workouts shift their emphasis from building further fitness to sharpening the established fitness into its most event-specific forms.

The Speciality Phase is where the workouts reach the height of their intensity, but the training volume each week mildly declines. This becomes a balance between workouts that test your event readiness while gradually trimming the overall training stress to shed fatigue. Each Speciality Phase includes a taper to make sure you are in top form before your event.

Specialty Phases contain two mesocycles, each lasting four weeks. This phase is highly specific to your event. The Speciality Phase fine-tunes the fitness you have.

Based on the above training principles, you can put your training plan together in a simplified format called the YPI. Refer to **Annex 4** for the Yearly Planning Instrument Sample Template and Guide.

13. Training Terminology (Advance)

Some might call it cycling slang, or the vocabulary of a cyclist. Either way, getting into the sport and wanting to know what people are saying, being familiar with these words will help.

Functional Threshold Power

Functional threshold power (FTP) has a few definitions, however, ordinarily intends to reflect the maximal consistent state power a cyclist can create for a continued period (for example 45mins to an hour and a half), with 1 hour being the most common duration. It is proposed to align closely with the lactate threshold - which is the maximal force that can be sustained without an exponential increase in lactate levels.

Critical Power

Critical Power (CP), or maximum mean power (MMP), is the best average power (measured in watt) cyclists can produce on a bike in each time frame. A Critical Power for five minutes (denoted as CP5) of 300 watt means that cyclists can drive for five minutes with 300 watts, before they are exhausted.

Maximum Minute Power (MMP)

The brief test is intended to repeat the burdens of the last moment of a slope test and in this manner is a decent method to gauge cyclists' most extreme moment power. After undertaking a brief test on the Wattbike, the exhibition screen extrapolates cyclists' information to give an expected most extreme moment power.

Maximal Aerobic Power (MAP)

Regularly in lab conditions a MAP test is performed by riding at progressively harder efforts to fatigue. There's a couple of various conventions, yet it would commonly begin at about 250watts and increment 50 watts each 2 or 3 minutes until failure.

Polarised Model (LT1 & LT2)

This model is utilized by a few national federations and coaches and is all around upheld in the scientific literature. In contrast to the past model, which is moored around one physiological variable (either FTP, limit pulse, or max pulse), the spellbound model depends on two physiological cut-focuses, characterizing explicit metabolic conditions inside the body. These cut-focuses are either the first and second ventilatory edges or the first and second lactate edge or turn points (i.e. Lactate Threshold 1 [LT1], Lactate Threshold 2 [LT2]), contingent upon the particular testing convention utilized.

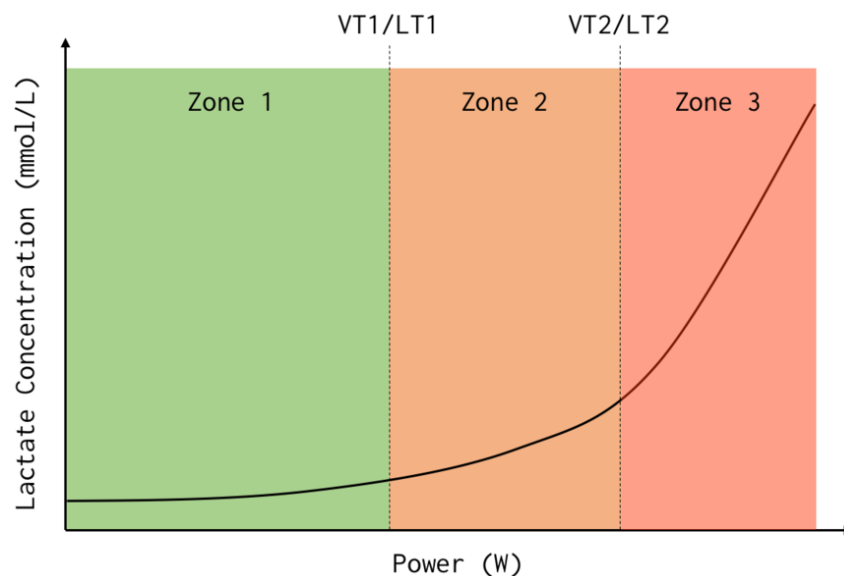


Figure 13.1 Lactate Threshold and Power Relationship

All in all, the lower slice point is proposed to catch the remaining task at hand at which lactate levels become considerably raised above resting levels, and the proportion of lapsed gas to oxygen utilization swings upwards, mirroring an expanded commitment to control creation from glycolysis. Above LT1/VT1, however underneath LT2/VT2, blood lactate levels can in any case be kept up in a consistent state yet are higher than they would be while resting.

The upper cut point (LT2/VT2) at that point extensively mirrors where blood lactate levels cannot, at this point be kept up in a consistent state, and start to gather quickly in any event, when force is held steady. Around this point, the proportion of lapsed air to terminate CO₂ likewise swings upwards. This mirrors where the oxygen consuming energy framework can presently don't coordinate energy interest.

14. Cycling Training Zones (Advance)

For every sport, there are different training zones and for cycling, there are seven power zones which are defined by Andrew Coggan, the co-author and cycling scientist behind *Training and Racing with a Power Meter*. These power zones represent ranges of medium-power values. These seven zones or levels means a specific training function such as Active Recovery, Endurance, Tempo, Threshold, Vo2Max, Anaerobic Capacity and Neuromuscular Power.

Zone	Name	% Functional Threshold Power (FTP)	% Heart Rate (HR)
1	Active Recovery	< 55%	< 68%
2	Endurance	56% - 75%	69% - 83%
3	Tempo	76% - 90%	84% - 94%
4	Threshold	91% - 105%	95% - 105%
5	VO2 Max	106% - 120%	> 106%
6	Anaerobic Capacity	121% - 150%	-
7	Neuromuscular Power	> 150%	-

Table 14.1 Training Zone (based on the seven power zones)

How to Calculate the Power Zone

There are few ways to decide the power zones. By using the percentage of Functional Threshold Power (FTP) value and find the higher limit of each zone. Apply the relative coefficients in the table below:

Zone	Range of Values (Relative to FTP)	Calculate the Higher limit
1	< 55%	FTP x 0.55
2	56% - 75%	FTP x 0.75
3	76% - 90%	FTP x 0.90
4	91% - 105%	FTP x 1.05
5	106% - 120%	FTP x 1.20
6	121% - 150%	FTP x 1.50
7	> 150%	Maximal

Table 14.2 Power Zones Calculation

It is recommended to measure the individual's FTP at least 4 times a year example during the preparatory phase, before the start of the racing season, during the racing season and in the period that follows the races. This allows individuals to adjust the range of values for their own Power zones and this can be done by using any power meter.

What Each of the Seven Zone Means

Zone 1 (Active Recovery): It should be very easy, little pressure when the cyclist pedal on it and light effort. Can breathe easily, have conversation with people, does not feel tired and individuals do not need much concentration to keep the pace. Zone 1 is usually after a race or sport event to aid recovery (unloading) after strenuous training days that helps the muscles to get rid of the lactic acid and the THR for this zone is less than 68%.

Zone 2 (Endurance): More intense than zone 1, conversation while riding should be the same (easy) but breathing will be a little heavier. The THR for this zone is 69% - 83%, daily (frequent) training at this level is possible and for around 2 - 3 hours but would need enough dietary carbohydrate.

Zone 3 (Tempo/medium): Breathing gets heavier, would need more concentration to maintain the effort, harder to talk and starting to feel uncomfortable. Feeling is important for this zone especially, doing back to back. This zone usually lasts about 20 minutes and up to an hour depending on the intensity and the THR is 84% - 94%. You can train for a few days straight but would require to take the correct amount of carbohydrates and follow by a good recovery such as sleep to relieve the muscle regeneration.

Zone 4 (Lactate Threshold): Conversation while riding will be almost impossible and individuals will feel the lactic burn and it requires concentration and determination to stay in the zone as it is mentally taxing. It is often performed during interval training for 10 - 30 minutes, for well-trained cyclists, it is possible for them to train for consecutive days at this level. If they have sufficient rest or appropriate recovery from prior training to be able to maintain the intensity. The THR for this zone ranges from 91% - 105%.

Zone 5 (VO2 Max): Breathing at this zone would be difficult and the effort will be difficult to maintain. Goal for this level is to increase the VO2 Max which is the maximum amount of oxygen being used per minute. It will last for 3 - 8 minutes and it is not possible to train at this pace for more than 30 - 40 minutes. Conversation is hard due to the 'ragged breathing', consecutive days training at this level is not advisable and the THR for this zone ranges from 106% - 120%. Although, the lack of heart rate will make it hard to get the average heart rate rise during these efforts. Therefore, concentrate on how your body is feeling.

Zone 6 (Anaerobic Capacity): Sustainable for 30 seconds to 3 minutes of high intensity intervals that aimed to increase the cyclist's anaerobic capacity and any longer means that the cyclist is probably not striving enough, very hard to do on back to back days and heart rate is too difficulty to go by effort due to non-steady state which is not useful as a guide to intensity. The fatigue in the legs is high, speaking to people is almost impossible and it is not recommended to train for a few consecutive days at this pace. The THR for this zone would be from 121% to around 150%.

Zone 7 (Neuromuscular Power): At this final zone, cyclists just go as hard as they possibly could go and the effort usually lasts for 10 seconds. It can be allocated to short and high-intensity training like jumps, short sprints that work more on the neuromuscular system rather than metabolic systems (aerobic).

15. Fitness Testing and Tracking (Advance)

The physical demands fluctuate significantly among the cycling disciplines, along these lines the appropriate tests for specific events and for specific cyclists will vary. For an instance, professional road cyclists will be keen on their VO₂max, while track sprint cyclists will need to think about their power and strength.

Getting quicker and more grounded is compensating from various perspectives. Execution cognizant cyclists appreciate keeping tabs on their development since it gives a standard to future correlation, offers criticism on the effect of another preparation routine and encourages them to comprehend your training zones (power or heart rate).

15.1 Functional Threshold Power (FTP)

FTP is the average number of watts that a rider can sustain in an hour, and acts as a current measure of fitness and identify training/intensity zones. FTP can be obtained using the following protocol as a guide:

Equipment: Indoor cycling bike with watts measurement

Length: 20 minutes (or 60 minutes)

Method: Warm up for 20–30 minutes prior, including a few efforts which invite exhaustion. Aim for a pace that is the hardest consistent effort an individual could go at. The pace should remain steady and not undulate. Their energy should be spent upon completion.

Output: Take the average power of that 20-minute effort and multiply it by 0.95 to get FTP. For example, if the average is 200 watts, FTP will be 190 watts

15.2 Critical Power Test

Critical power testing involves riding as hard as possible for three minutes, beginning at a maximal sprint, and then trying to maintain power as high as possible for the remainder of the three minutes. It is typically used as a means of understanding anaerobic work capacity (or functional reserve capacity as it can also be called). However, the average power over the last 30 seconds of the test - termed the 'critical power' - has been shown to closely approximate FTP (Functional Threshold Power) or lactate threshold, and so can be used as an estimate of FTP reliably.

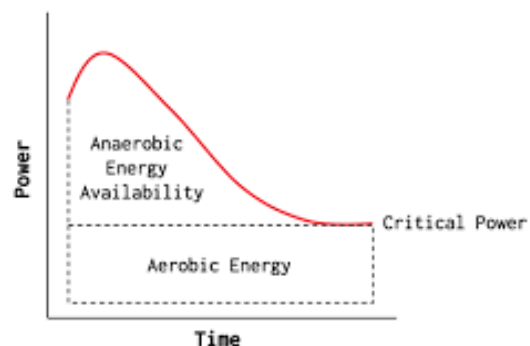


Figure 15.1 Critical Power Chart

Critical power can be measured using the following protocol as a guide:

Equipment: Indoor cycling bike with watts measurement

Length: Distance varies. CP3 is 3 minutes.

Method: Warm up for 15 minutes and then pedal as hard as possible for the chosen duration.

Output: Critical power is the average watts over an individual's last 30 seconds

15.3 Ramp Test

A ramp test will determine Maximal Aerobic Power (MAP) since the test is done aerobically from the beginning and reaches the maximum capacity of the individual's aerobic system at the end. Therefore, while their task is to ride until the absolute last moment they are able, the goal of the test is to capture an accurate understanding of their ability, to which their future workouts are calibrated in intensity. Whether a cyclist's FTP is found to have increased or decreased, an accurate result is a successful result as it will help them get the most out of your training. At the end of the test, they are given the option to accept or reject the results, so if they prefer, they can keep their current FTP or manually adjust it.



Figure 15.2 Ramp Test

Ramp test can be conducted using the following protocol as a guide:

Equipment: Indoor cycling bike with watts (or speed) measurement and a lap timer

Length: 6–12 minutes

Method: Warm up for 10 minutes. Start the ramp at a very easy pace. Increase power by 15 watts (or speed by 1 MPH) each minute without pause. Once an individual is unable to maintain the pace, the test ends.

Output: Individual's max watts in the final successful minute is their maximum aerobic power.

15.4 Endurance Cycling Test (VO2Max)

The VO2max test is the criterion measure of aerobic power in athletes. VO2 max measures how efficiently an individual can get oxygen in through their lungs. It's the amount of oxygen they can breathe in millilitres per minute, usually expressed in proportion to their bodyweight. VO2 max essentially tells an individual of how much oxygen their body is asking for, and how much their lungs can deliver – but it does not always follow that the athlete with the highest score wins the race.



Figure 15.3 VO2 Max Test

SCF National Cycling Syllabus

An exercise bike is the basis of most cycle ergometers used for VO₂max testing, though a method of adjusting and measuring the power output is usually required. A commonly used cycle ergometer is the Monark bike. Sometimes the subjects can use their own bicycle, placed on rollers or a treadmill, for the testing. This has the advantage of having the correct bike setup for the athlete.

16. Tactics in Cycling (Advance)

16.1 Single Handed Cycling

This skill is essential so that it enables cyclists to replenish and signal without stopping. It is important to engage the core muscles and keep the shoulders pointed straight to avoid swerving. Here are some exercises to strengthen core stability. One can start by doing 3 sets of 30s - 40s for each exercise and gradually increase the number of sets and time



Figure 16.1 Plank, Bird Dog, Boat Pose, Tipping Bird

16.2 Gear Shifting

Use One Shifter at a Time: To simplify gear shifting and minimize stress on the drivetrain, do not shift both the front and rear shifters at the same time. Remember: shift the chain between the front chainrings for big changes, then use the rear cogs to fine-tune your gear setting

Avoid Cross Chaining: Picking gears that put chains on opposite extremes of the front cogs and rear cassette at the same time (cross-chaining) is hard on the drivetrain. Instead stick with rear cogs that are relatively close in alignment with the front cog you choose.

Top View

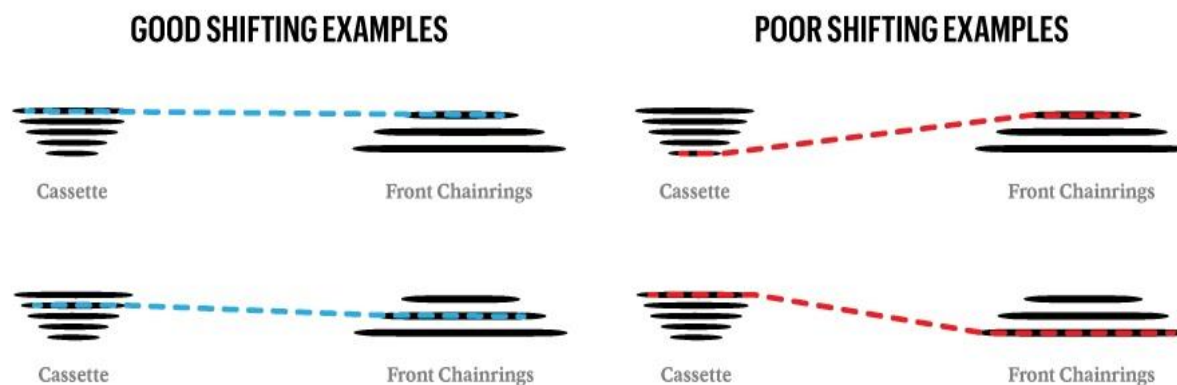


Figure 16.2 Positioning of Chains

16.3 Tactics for Race (Road)

Drafting

Drafting occurs when a cyclist moves into an area of low pressure behind another cyclist, reducing the wind resistance and the amount of energy required to pedal by 30%-40%. To gain maximum draft, cyclists should position themselves in the middle of the peloton with riders in front, behind and to either side. This protects them from the wind from each angle. One should stay at least 10-20 cm away from the wheel in front.

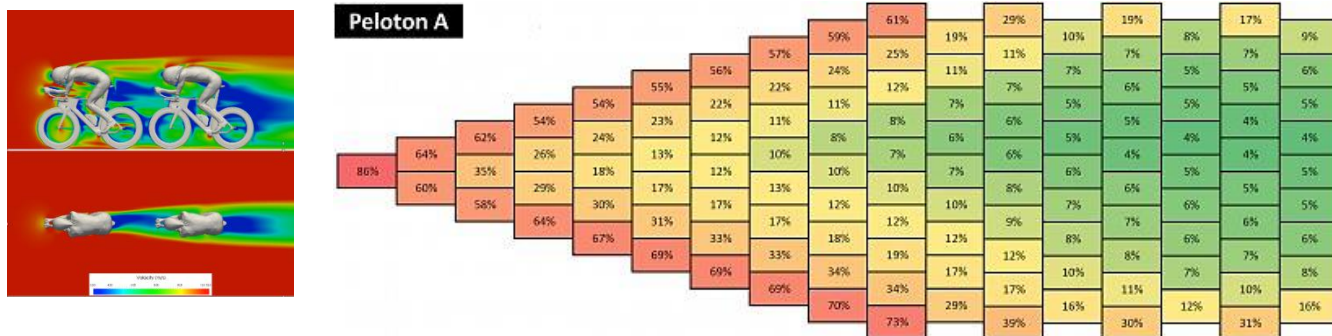


Figure 16.3 Example of a Peloton

Pacing

The harder cyclists go, the faster they burn through their reserves. Using a pacing plan will ensure them to optimize energy expenditure. If cyclists pace the event correctly, they will cross the finish line just as they're using the last bit of energy. Pacing commonly improves finishing times in such events by 1% to 3%. Very fast starts may worsen finishing times even more. Ideally, cyclists should maintain a pace that corresponds with about 70 percent of their max heart rate (to find your max heart rate, take 220- age). One can use a heart rate monitor to keep an eye on their heart!

Lactate Buffering

If cyclists accumulate Lactate acid with anaerobic effort, they must recover to buffer this acid. The goal in pacing is to do the max power possible across the course, but if we spike acid too early then we will ultimately go slower. Save energy for attacks and sprints where the body switches to anaerobic.

Sprinting

Sprinting is an action used to catch up with a group/peloton, breakaways, and in the final stretch of the race. It is important to get the technique right for maximum power



Figure 16.4 Sprinting Position

Sprinting Tactics

- Keep Shifting: While standing and sprinting, cyclists might find that their cadence is getting too fast and their power output is levelling off. To keep accelerating, cyclist should continue to shift into harder gears
- Arms control the bike: as one sprints, pushing and pulling on the handlebars allows cyclists to move their bike from side to side underneath them. This will help cyclist to control the bike.

16.4 Tactics for Race (MTB)

To improve in MTB racing, it is important to focus on the things that are within your control. It is important to practice the course before the race, usually done the day before or any allocated practice sessions on the same day. Practice the course at a conservative pace to save energy and focus on choosing routes that matches your technical abilities.

Positioning is also important when the race starts, so fast starts are crucial in establishing your position in the pack when getting to the first section of the track. Practice starting with one foot on the ground, and with the other pedal at the 2 o'clock position to get the power down fast as soon as the start whistle/horn goes. Most races are fast starts by nature, make sure to be fully warmed up by establishing a routine that would help you work up a sweat and have elevated heart rates and feeling slightly out of breath.



Figure 16.5 MTB Racing

Overtaking fellow competition can be quite difficult in a MTB race, especially if the course is technical and narrow. Choose overtaking moments carefully and make conscious effort to complete the manoeuvre. Common ways are to enter into a descent first and then putting in an effort at the next climb to create gaps or to let a small gap open between you and the opponent, and accelerate and pass with speed, taking your opponent by surprise.

Knowing how to hold your position to avoid being overtaken is also important. Relying on your posture on the bike, by pushing your elbows out, and owning the space help to further narrow down the gaps for another rider to slide through. However, it is also sometimes more beneficial to let someone lead, so race smart and choose your battles wisely.

16.5 Tactics for Race (BMX)

Like MTB racing, BMX race starts are also fast but usually uses a start gate that drops to “release” the riders. By learning how to balance at the gate with both feet on the pedals, it will help to get a faster start, and not have to worry about missing the pedal once the gate drops.



Figure 16.6 BMX Racing Start Gate

BMX racing takes more than just fitness and strong legs, technical skills will allow you to navigate the course smoothly, and with minimal loss of speed or time:

Ratcheting - Back pedalling briefly to get timing right in order to maximise pedal clearance. In slow situations, it sometimes helps when you do not have to pedal a full revolution.

Wheelie Drop - A wheelie drop allows you to ride off a ledge or drop with very little to no speed. As your front wheel is leaving the ledge you want to wind up and pedal hard, while simultaneously pulling up your handles a little bit and ride off the ledge. Try your best to land on both wheels and to absorb the landing as much as possible with your body.

Manual - This is usually done while standing up. You will first want to use your arms and bend down on your handlebars and pop up with your arms straight out, lifting the front wheel off the ground. If you look down, your front wheel will most likely go back down. So you will want to look forwards. Shift your body weight as far as possible without your bike going vertical. You can balance yourself with your knees, bending them will make the front wheel go down, and extending them will bring them up, by bending and extending you can keep yourself balanced.

Wheelie - You may want to adjust your seat to a low position. As you will be riding the wheelie sitting down. Put the bike in medium or low gear and begin at rolling speed. Pedal down and pull up on the handlebars simultaneously. Lean back as if you were on a rocking chair and continue pedalling. Your arms should be straight out, and you should be sitting on the tip of your seat. After getting the hang of that, you will need to be able to control the balances vertically and horizontally. Adjust the vertical balance with the rear brake, if you are leaning too far back, or by pedalling, if your front wheel starts to drop. Control sideways horizontal balance by sticking out a knee or by turning the handlebars in the opposite direction of where your bike is leaning towards.

Bunny Hop - You will want to first use your arms and bend down on your handlebars and pop up with your arms out. This lifts the front wheel off the ground. As your wheel is about to reach its peak height move your body forwards and upwards, this lifts the back wheel up. If timed right, this should result in you being able to lift both wheels off the ground. You can first practice both these motions separately before attempting a bunny hop.

Pumping - These are done over bumps. If you hit a bump at full speed and did not know how to pump, you would get airtime and likely lose some speed. When you are going towards the bump prepare to allow your bike to come up toward you by not applying your bodyweight on it. As you go over the bump, you push your weight back down on your handlebars and pedals. This will keep your bike planted on the floor, maintaining speed.

17. Maintaining Your Bicycle

Maintaining the bicycle is important, it needs lots of care, attention in order to have a smooth ride while using it and keeping it in top condition. Just like owning a car, the car would also need maintenance every few months.

There are some basic or simple steps for bike maintenance that any cyclist is doing. By keeping the bike clean is one of the routines one can perform to prolong their bike. Especially when riding in wet conditions or muddy areas often, bike parts are important to make the bike work properly.

For better results, it would be good to use bike cleaners. Just like tools being stored inside the toolbox similarly, this is a little version of it where cyclists can put all the cleaning tools inside. Which consists of different kinds of sprays and brushes and all of it has a different function.



Figure 17.1 Example of a Bicycle Cleaning Kit

Cleaning also helps to protect the bike parts from damage and helps to keep corrosion too, other than keeping it glowing. After spraying the cleaner on the bike, wash it after a few minutes by rinsing it with a pail of water or a pipe but not at a high pressure as it will wash away all the grease tainted on the bearings.

Simple way of cleaning the bike if cyclist's or individuals do not want to buy the bike cleaner kit, they can still clean their bike by having pails of water or hose which would be easier, soap, brushes and a rag. After cleaning it, cyclists would need to lubricate the drivetrain which consists of the front chain rings, cassette, derailleur and chain. This will help extend the lifespan of the chain and give a smoother gear shift and ride. When to lubricate the chain depends on how, where and when the individuals ride the bike. If they always ride mostly, under wet conditions or muddy places, they should clean and lube it after every ride in order to make the chain less filthy.

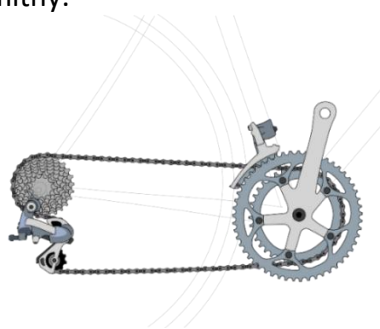


Figure 17.2 Bicycle Drivetrain



Figure 17.3 Pumping and Checking Tyre Pressure

Next, would be checking the tyre pressure often for three to four days and pump the tyre between 80 - 120 psi. The tyre pressure looks into the factors of the road surfaces, tyre size, the type of the bike, riding conditions and the body weight of a person. If the tyre is wider, the air pressure will be lower given that other variables remain constant.

Make sure to check on the brakes of the bike before going for a ride every time as it is important for not only the own safety of the cyclists but also other people around them when they are riding it out. Every time before an individual ride off, test the brake by turning the pedal of the bike, press and hold onto the brake levers and ensuring that it stops. If the cyclist presses the brake lever and it moves a lot towards the handlebars, the cyclist would need to tighten it. If there is a need, change worn brake pads by using Allen keys. Worn brake pads can be identified by being unable to see the grooves anymore. Ensure that brakes are centred and brake pads are not rubbing against the tyres.

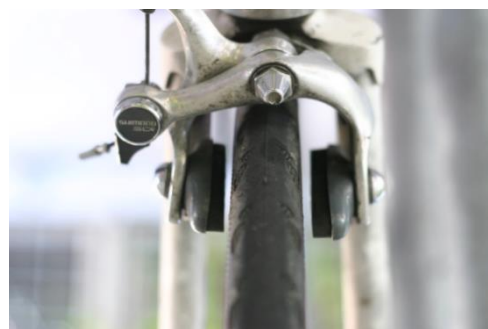


Figure 17.4 Brake Pads

Besides checking the brakes, ensure that the nuts and bolts are held tightly together. To avoid the bike from falling apart when they are riding it, the easiest way to test is to bounce the bike lightly off the ground and hear or keep a lookout for any nuts and bolts which are loose. When tightening the nuts and bolts, do check the manufacturer's manual for the correct torque specs. If in doubt or unsure, cyclists should visit a bike shop to seek advice.

Lastly, having a bike stand will allow you to comfortably work on the bike at a better position. It also allows cyclists to turn the pedals easily while applying the lubricate or remove the wheels of the bike and clean all the other parts that are hard to reach.

18. Code of Conduct

18.1 For Coaches and Teachers

Ethics refers to the generally accepted norms of right or wrong behaviour, often based on universal values. Ethics is not about legality nor is it meant to be legalistic. However, they are set in place to ensure proper conducts are adhered to.

Coaches, due to their close interaction with athletes, exposure to the public, and the strong pressure to win, are potentially vulnerable to various forms of ethical issues and concerns. If coaching is to be recognised as a profession, it is important that there exists a code of ethics for coaches. Coaches, by adhering to a code of ethics, would not only minimise the likelihood of being accused of unacceptable behaviour but would also project a sense of professionalism in their dealings with others and also demonstrate their commitment to providing quality services and expertise.

Three Principles of Coach's Code of Ethics	Key Ethical Standards
Respect for Individuals	<ul style="list-style-type: none"> • Treat and respect everyone equally, regardless of race, language, religion, culture, gender or physical ability. • Recognise that your athletes can contribute in providing positive feedback on training methods and how best performance during training and competition could be optimised. Be a good listener when occasions for such interaction arise. • Remember that there is a need for certain information to be kept confidential. Disclosure of such information should only be made with the consent of those who requested confidentiality. • Be sensitive to the feelings of your athletes when providing feedback on their training progress and performance during competition. Criticisms, if any, should not be directed at your athlete, instead it should be on your athlete's performance.
Responsible Coaching	<ul style="list-style-type: none"> • Be responsible for periodically updating your coaching expertise through participation in courses, conferences and workshops and through information available in resource materials. • Prepare well-planned and sound training programmes and execute them in a manner that would benefit all your athletes. • Recognise the limits of your knowledge and collaborate with other qualified practitioners. Where appropriate, refer your athletes to a more qualified coach or specialist.

Table 18.1 Coach's Code of Ethics

Source: Sport Singapore Coach's Code of Ethics

	<ul style="list-style-type: none"> • Advise your injured athlete to seek further medical treatment and suggest an appropriate recovery plan whenever possible. When deciding on your injured athlete's ability to continue training or competing, do take into account his/her future health and general well-being. • Ensure that training and competition venues meet with minimum safety standards and that your athletes are properly attired. • Avoid sexual intimacy with your athlete. Any physical contact with your athletes should be only when absolutely necessary and during appropriate situations.
<p>Integrity in Actions</p>	<ul style="list-style-type: none"> • Be honest and sincere when communicating with your athletes. Do not give false hopes to your athlete. • Inform a fellow coach if and when you are working with his/her athlete(s). • Your coaching qualifications and experience should be accurately represented, both in written and verbal form. • Abide by the rules of your sport and respect your opponents and those in positions of authority. • Adopt a professional attitude and maintain the highest standards of personal conduct. It should encompass your mannerism, dress and language. • Exercise self-awareness and evaluate how your values and actions influence your coaching activities positively or negatively. • Uphold the values of clean, dope-free sport, by complying with all relevant anti-doping rules that are in line with the World Anti-Doping Code and cooperating with relevant anti-doping authorities should a need arise. Be a positive influence to those under your charge with respect to the values of clean sport.

Table 18.1 (Continued)

18.2 For Parents

Some parents can be very involved in their children's activities to the extent that it interferes with the program that a coach or teacher has drawn up. Below are some recommendations that parents can consider when getting involved in their children's activities.

Essentials	Behaviour
<ul style="list-style-type: none"> • Make sure your child has the right kit for the session as well as enough food and drink. • Make sure your child arrives to sessions on time and is picked up promptly. • Complete all consent, contact and medical forms and update straight away if anything changes. • Make sure your child wears any protective kit provided or otherwise. • Maintain good relationship with your child’s coach or teacher and catch up with them as much as you can about your child’s development. 	<ul style="list-style-type: none"> • Try and learn about your child’s sport and what it means to them. • Take the time to talk to your child about what you both want to achieve through the sport. • Remember that children get a wide range of benefits from participation in sport, like making friends, getting exercise and developing skills. It’s not all about wins and losses. • Listen when your child says they do not want to do something. • Behave positively on the sidelines – shout encouragement, say “Well done” and let your child know you are proud of what they are doing. • Think about how the way you react and behave affect not just your child but other children too. • Lead by example when it comes to positive behaviour on the sidelines or let other parents take their cues from you. • Accept the official judgement and do not enter the field of play during competition. • Use social media responsibly when talking about what goes on at the school, club, etc. by behaving in the same way online as you would in person. • Talk to your child about embracing good etiquette and sportsmanship. • Encourage your child to play by the rules. • Ensure that your child understands their code of conduct.

Table 18.2 Recommendations for Parents

Adapted from Child Protection in Sport Unit, National Society for the Prevention of Cruelty to Children, UK

18.3 For Athletes

Athletes are an integral part of the sports ecosystem. Most athletes train with a NSA, club, school or other organisation. They are expected to exhibit certain behaviour that are expected of them as elite sport individuals. Athletes are thus required to meet the highest ethical standards set by their training organisation and coaches. Below is a list of areas for ethical conduct.

Area	Ethical Standards
Training, Competition & Performance	<p>Submit his/her annual performance goal and annual training plan.</p> <p>Endeavour to participate in assigned events, which include local/international competitions, national team training sessions and activities.</p> <p>Shall strictly abide by the rules, regulations and guidelines.</p>
Integrity Standards	<p>Maintain Reputation of Organisation: not act in a manner likely to affect adversely the reputation of the organisation he/she is training with, nor act in a manner likely to bring the sport into disrepute;</p> <p>Honesty: to act with utmost integrity and honesty at all times including acting in good faith towards others and with mutual trust and understanding in all their dealings;</p> <p>Fulfil Duties: to actively fulfil his/her duties and responsibilities, with all due care and skill and in good faith and in particular not to act outside of their authority;</p> <p>Proper Conduct: to conduct himself/herself in a professional and courteous manner and in particular to refrain from using language or conduct that is obscene, offensive or of an insulting nature towards another person;</p> <p>Equality: not to unlawfully discriminate on the basis of race, sex, ethnic origin, colour, culture, religion, political opinion, marital status, sexual orientation or other differences;</p> <p>Dignity: to safeguard the dignity of individuals and not to engage, (directly or indirectly) in any form of harassment, whether physical, verbal, mental, sexual or otherwise;</p> <p>Maintain Confidentiality: to keep confidential all information which is entrusted to him/her in confidence unless permitted to disclose such information under the Code or required to disclose such information by law.</p> <p>Fair Play: to respect the spirit of fair play and non-violence and behave accordingly on the sporting arena; and</p> <p>Good Sportsmanship: to exhibit good sportsmanship at all times, by respecting coaches, referees, judges, competitors or officials from Singapore and other countries.</p>
Social Media Platform	<p>Shall adhere to the Integrity Standards when posting on social media.</p> <p>Shall be personally liable for the content he/she posts on social media, which only reflect his/her personal opinions or views, and are not representative of the organisation he/she is training with. The Athlete can be held personally liable for comments deemed defamatory, misrepresentative or obscene.</p> <p>Shall not use videos, photographs and audio recordings (the "Contents"), which were made during the organisation's events. Such content falls under the intellectual property of the organisation, and is only authorised for personal use only, and not for commercial gains. The Athlete shall obtain prior written consent to publish the Contents, as well as seek permission from the other persons in the said Contents.</p>
Anti-doping Rules	<p>Shall comply with the World Anti-Doping Code and Anti-Doping Singapore Policies.</p> <p>Shall do his/her own due diligence to ensure that he/she does not consume any prohibited substance under the Anti-Doping Rules.</p> <p>When required, the athlete shall avail himself/herself for testing in accordance with the Anti-Doping Rules.</p>

*Table 18.3 Athletes' Code of Conduct
Adapted from Singapore Athletic Association*

Appendix

1. Road Traffic (Bicycles) Rules

ROAD TRAFFIC ACT
(CHAPTER 276, SECTION 140)

ROAD TRAFFIC (BICYCLES) RULES

R 3

REVISED EDITION 1990

(25th March 1992)

[25th November 1955]

Citation

1. These Rules may be cited as the Road Traffic (Bicycles) Rules.

Definitions

2. In these Rules, unless the context otherwise requires —

[Deleted by S 273/2018 wef 05/05/2018]

“hours of darkness” means the time between 7 p.m. and 7 a.m. the following day, both times inclusive;

[S 273/2018 wef 05/05/2018]

[Deleted by S 273/2018 wef 05/05/2018]

Towing not permitted

- 3.—(1) A rider of a bicycle, power-assisted bicycle, trishaw or tricycle on a road —

(a) must not tow another vehicle, with or without a person in or on that other vehicle; and

(b) must not be towed by another vehicle.

- (2) A rider of a bicycle, power-assisted bicycle, trishaw or tricycle on a road must not hold onto another vehicle while the vehicle is moving on the road.

[S 273/2018 wef 05/05/2018]

Restriction on number of persons carried

- 4.—(1) No bicycle, power-assisted bicycle, trishaw or tricycle shall be used to carry at one time more persons than the number for which it is designed.

[S 273/2018 wef 05/05/2018]

- (2) Except as provided in paragraph (3), but subject to paragraph (4), no person shall

be carried as a pillion passenger on a bicycle, power-assisted bicycle, trishaw or tricycle unless the bicycle, power-assisted bicycle, trishaw or tricycle is designed such as to be provided with a seat for a pillion passenger.

[S 273/2018 wef 05/05/2018]

(3) A child below the age of 12 years may be carried on a properly constructed seat or carrier affixed to a bicycle, trishaw or tricycle.

[S 273/2018 wef 05/05/2018]

(4) No person below the age of 16 years shall be carried as a pillion passenger on a power-assisted bicycle.

[S 773/2004 wef 01/01/2005]

Riders to give signals

5. The rider of a bicycle, power-assisted bicycle, trishaw or tricycle shall in order to inform traffic that he intends —

- (a) to 'stop' — hold out his right arm horizontally with the forearm vertical and with the palm of the hand to the front;
- (b) to 'slow down' — hold out his right arm horizontally with the palm of the hand downwards, and move the arm up and down several times;
- (c) to 'proceed to the right' — hold out his right arm horizontally with the palm of the hand to the front; and
- (d) to 'proceed to the left' — hold out his left arm horizontally with the palm of the hand to the front.

[S 273/2018 wef 05/05/2018]

Signals to be made in sufficient time

6. Signals under rule 5 shall be made in sufficient time to enable traffic to take appropriate action for the avoidance of danger.

Travelling abreast prohibited

7.—(1) No bicycle, power-assisted bicycle, trishaw or tricycle shall be ridden on the right of a motor vehicle proceeding in the same direction except when overtaking that motor vehicle.

[S 773/2004 wef 01/01/2005]

[S 273/2018 wef 05/05/2018]

(2) Subject to paragraphs (3) and (4), the rider of a bicycle, power-assisted bicycle, trishaw or tricycle on a road with a single lane must not ride the bicycle, power-assisted bicycle, trishaw or tricycle (as the case may be) such that it remains abreast and to the right of another rider of a bicycle, power-assisted bicycle, trishaw or tricycle in that lane.

[S 273/2018 wef 05/05/2018]

(3) Paragraph (2) does not prevent the rider of a bicycle, power-assisted bicycle, trishaw or tricycle overtaking the rider of another bicycle, power-assisted bicycle, trishaw or tricycle.

[S 273/2018 wef 05/05/2018]

(4) The rider of a bicycle, power-assisted bicycle, trishaw or tricycle on a road with 2 or more lanes for the use of vehicles travelling in the same direction may ride the bicycle, power-assisted bicycle, trishaw or tricycle (as the case may be) in one lane such that it remains abreast and to the right of another rider of a bicycle, power-assisted bicycle, trishaw or tricycle in that same lane and direction.

[S 273/2018 wef 05/05/2018]

(5) The rider of a bicycle, power-assisted bicycle, trishaw or tricycle on a road with a bus lane must not ride the bicycle, power-assisted bicycle, trishaw or tricycle (as the case may be) such that it remains abreast and to the right of another rider of a bicycle, power-assisted bicycle, trishaw or tricycle in the bus lane during its hours of operation.

[S 273/2018 wef 05/05/2018]

(6) When a bicycle lane is provided on part of a road, no bicycle, power-assisted bicycle, trishaw or tricycle shall be used on any other part of the roadway.

[S 273/2018 wef 05/05/2018]

Bicycle, etc., to be ridden on left side of road

8. A person who rides a bicycle, power-assisted bicycle, trishaw or tricycle on a road must ride the bicycle, power-assisted bicycle, trishaw or tricycle as near as practicable to the far left edge of the road.

[S 273/2018 wef 05/05/2018]

Load limitations

9.—(1) A person must not ride a bicycle or power-assisted bicycle on a road carrying a load that —

- (a) is of such dimensions as to cause or be likely to cause danger, obstruction or annoyance to persons using the road; or
- (b) is not properly and rigidly secured to the bicycle.

(2) A person must not ride a tricycle on a road carrying a load that —

- (a) is overhanging from the tricycle; or
- (b) is of a height that is more than one metre from the ground.

[S 273/2018 wef 05/05/2018]

Bicycle, etc., to be ridden in orderly manner

10. No bicycle, power-assisted bicycle, trishaw or tricycle shall be ridden or propelled

No riding against flow of traffic

11. A person must not ride a bicycle, power-assisted bicycle, trishaw or tricycle on a road against the flow of traffic.

[S 273/2018 wef 05/05/2018]

Lights on bicycle, etc.

11A. A person must not ride a bicycle, power-assisted bicycle, trishaw or tricycle on a road, during the hours of darkness unless the bicycle, power-assisted bicycle, trishaw or tricycle —

- (a) displays a white light that is clearly visible for a reasonable distance from the front of the bicycle, power-assisted bicycle, trishaw or tricycle, as the case may be; and
- (b) displays —
 - (i) a red light that is clearly visible for a reasonable distance from the rear of the bicycle, power-assisted bicycle, trishaw or tricycle; or
 - (ii) a red reflector that is clearly visible for a reasonable distance from the rear of the bicycle, power-assisted bicycle, trishaw or tricycle when light is projected onto the reflector.

[S 273/2018 wef 05/05/2018]

Restriction on nature of lights

12.—(1) No bicycle, power-assisted bicycle, trishaw or tricycle shall show a red light to the front.

[S 273/2018 wef 05/05/2018]

(2) No bicycle, power-assisted bicycle, trishaw or tricycle shall show any light other than a red light to the rear.

[S 273/2018 wef 05/05/2018]

Requirements for use of power-assisted bicycle

13.—(1) No person shall keep or use a power-assisted bicycle on a road unless the power-assisted bicycle —

- (a) complies with the requirements specified in the Schedule to the Road Traffic (Power-Assisted Bicycles — Approval) Rules 2004 (G.N. No. S 768/2004);

[S 273/2018 wef 05/05/2018]

- (b) has been approved and sealed in accordance with those Rules; and
[S 273/2018 wef 05/05/2018]
- (c) has been registered and bears a registration number plate in accordance with the Road Traffic (Registration of Power-Assisted Bicycles) Rules 2017 (G.N. No. S 451/2017).
[S 273/2018 wef 05/05/2018]
[S 273/2018 wef 05/05/2018]

(2) No person below the age of 16 years shall ride a power-assisted bicycle on a road.

(3) *[Deleted by S 65/2019 wef 01/02/2019]*

Wearing of helmets

14. Every person who —

- (a) rides a bicycle or a power-assisted bicycle on a road; or
- (b) is carried as a pillion passenger on a bicycle or a power-assisted bicycle on a road,

must wear securely on his head a suitable protective bicycle helmet.

[S 65/2019 wef 01/02/2019]

2. List of Local Cycling Venues

Cycling Trails

- Changi Airport Connector
- Changi Beach
- Rower's Bay Park
- Coast-to-Coast (C2C) Trail
- Kranji Marshes Loop
- Mandai Loop
- Marina Bay
- Coney Island
- Punggol Waterway Park
- Northern Explorer Loop
- Eastern Coastal Park Connector
- Western Adventure Loop
- Southern Ridges Loop
- Northern Eastern Riverine Loop

Mountain Bike Trial

- Chestnut Nature Park
- Ketam MTP Trial
- Bukit Timah MTB Trial
- Kent Ridge MTB Trial
- Mandai Track 15

Road Bike

- Marine Cove – ECP 40km Loop from Bedok Reservoir
- The Marina Barrage – ChangiCoastalPark 2 NSRCC Loop from Bartley
- Marine Cove – The Marina Barrage Loop from Sentosa Cove
- Marine Cove – The Marina Barrage Loop from Bukit Gombak
- Lorong Halus Bridge – Marine Cove Loop from Great World
- Thomson Park – The Crown Bakery Loop from Napier
- Mount Faber Loop and view – Sentosa Gateway Loop from Newton
- The Marina Barrage – ChangiCoastalPark 2 NSRCC Loop from Orchard Boulevard
- ECP 40km – Bedok Jetty Loop from Eunos
- Thomson Park – Sentosa Gateway Loop from Telok Ayer
- Sentosa Gateway – Mount Faber Loop and view Loop from Orchard
- Marine Cove – The Marina Barrage Loop from Bedok
- Thomson Park – The Crown Bakery Loop from King Albert Park
- Crank n' Chain – Sentosa Gateway Loop from Bedok
- Thomson Park – Woodlands Waterfront Park Loop from Beauty World
- Lim Chu Kang Road – Kranji Dam Loop from Teck Whye
- Mount Faber Loop and view – Sentosa Gateway Loop from Bedok Reservoir
- Bedok Jetty – Marine Cove Loop from Tampines East
- The Crown Bakery – Fullerton Loop from Hillview
- Lorong Halus Bridge – Lower Seletar Reservoir Loop from Coral Edge

3. Stages of Athlete Progression (Foundation & Development)

Stage of athlete progression	Talent stage	Age Group	Training Focus	Duration of training focus	Learning Outcomes
<p>Foundation</p> <p>1. Learning of Fundamentals</p> <p>2. Extension of FMS</p>	<p>Detection – early childhood is a critical period for the development of fundamental movement skills (FMS). Young children pick these up from enjoyment of a wide variety of activities, starting at home.</p> <p>A regular active lifestyle can boost brain development and encourage better concentration levels for young children.</p>	<p>8 to 12 years</p>	<p>(i) Cycle Safe Cycle 1-3</p> <ul style="list-style-type: none"> - Cycle Safe Practical Skills Assessment - Cultivate riding awareness - Expedition at the end <p>(ii) Encourage exposure to a variety of sports</p>	<p>1 and 2 (first 6 months)</p>	<p>1. Able to do bike safety check, basic bike fit</p> <p>2. Confidence in riding – straight line, turning, braking, starting and stopping, mounting and dismounting</p> <p>3. Road Safety and riding on park connectors (PCN), riding in a small group</p>
			<p>Exposure to BMX and MTB Downhill to identify talents</p> <p>Participation and Experience</p> <p>(i) Riding on different terrain and over obstacles</p> <ul style="list-style-type: none"> - Skill set A, B and C <p>(ii) Use of different gearing</p> <p>(iii) Introduction to plyometrics – transference to cycling skills</p>	<p>(6-12 months after starting)</p>	<p>1. Confidence on climbing and descending, banking</p> <p>2. Technical skills: Ratcheting, Pedal Stab, Wheel up, Roll over, Wheelie drop, Bunny hop</p> <p>3. Develop confidence to go onto the MTB trails and able to complete the BMX pump track</p>

SCF National Cycling Syllabus

Stage of athlete progression	Talent stage	Age Group	Training Focus	Duration of training focus	Learning Outcomes
<p>Development</p> <p>1. Demonstrating Potential</p>	<p>Identification Identify athletes capable of top performance within sports specific discipline</p> <p>Selection Fulfilling potential when developmental opportunities arise either through:</p> <p>1) Natural talent selection: based on performance</p> <p>2) Scientific talent selection: based on potential established through measurements by sports science experts</p>	<p>13 to 16/17 years of age</p>	<p>Introduce to MTB (XCO), Road, Track</p> <p>Participation and Experience General (Experience, Skills, Technique, Tactics)</p> <p>transiting to</p> <p>Specialisation (Physiological, Psychological, Commitment)</p> <p>Riding for fitness (i) Instil a good work ethic and self-discipline (ii) Develop power, speed, endurance, agility and strength (iii) Identify goals – Performance, fitness, fun etc</p> <p>Introduction to track cycling - Talent ID those suitable for track through Power Profiling Test (6" and 30")</p> <p>Time taken to complete 200m, 1km</p>	<p>Second year (After 12 months)</p>	<p>1. Improvements on completion time for Skill set A-C</p> <p>2. Improvements in power, rpm, speed</p> <p>3. Some understanding of training programs and periodisation, different training zones and their purpose</p> <p>4. Identify athletes interested to pursue cycling and exposure to the different cycling disciplines</p>

SCF National Cycling Syllabus

Stage of athlete progression	Talent stage	Age Group	Training Focus	Duration of training focus	Learning Outcomes
<p>Development</p> <p>1. Discipline Specific Commitment</p>	<p>Confirmation</p> <p>Design developmental programmes with athlete benchmarking and monitoring tools to maximise talent development</p>	13 to 16/17 years of age	<p>Specialisation (Physiological, Psychological, Commitment)</p> <p>Riding to train</p> <p>(i) Tactical skills</p> <ul style="list-style-type: none"> - Choosing the line to take - Understand transitions and terrain changes <p>(ii) Physiological</p> <ul style="list-style-type: none"> - Heart rate zones and power zones (Base, LT1, LT2, CP, MAP, FTP) <p>(iii) Psychological</p> <ul style="list-style-type: none"> - Mental resilience - Build confidence and passion <p>Working towards individual goals</p>	Depending on individual abilities and interest	<p>1. A group of riders fully committed to training</p> <ul style="list-style-type: none"> - Regular competitions depending on their individual abilities <p>2. Improved ability to ride in a big group</p> <ul style="list-style-type: none"> - Strong bike handling skills - Ability to react quickly to the environment around them <p>3. Increased training capacity</p>
<p>Development</p> <p>1. Introduction to High Performance Environment</p>	<p>Confirmation</p> <p>Design developmental programmes with athlete benchmarking and monitoring tools to maximise talent development</p>	13 to 16/17 years of age	<p>Specialisation (Physiological, Psychological, Commitment)</p> <p>Riding to Compete</p> <p>(i) Tactical</p> <ol style="list-style-type: none"> 1. Decision making under pressure 2. Understand racing strategies 3. Build competition skills <p>(ii) Physiological</p>	Depending on individual abilities	<p>1. Highly motivated and committed group of riders</p> <ul style="list-style-type: none"> - Athletes taking ownership of their training - Able to identify strengths and weaknesses and areas to work on <p>2. Refining skills and develop competition tactics</p> <ul style="list-style-type: none"> - Understand race analysis

SCF National Cycling Syllabus

Stage of athlete progression	Talent stage	Age Group	Training Focus	Duration of training focus	Learning Outcomes
			4. Pacing strategies 5. Strength and power development 6. Recovery techniques (iii) Psychological 7. Working towards consistent performance Ability to execute skills consistently in different situations/environments		1. Achieving consistent results during training and competitions

4. Yearly Planning Instrument Sample Template & Guide

Sport/NSA																																																																			
Athlete/Team																																																																			
Period																																																																			
Long Term Goal																																																																			
Month	Jan-21				Feb-21				Mar-21				Apr-21				May-21				Jun-21				Jul-21				Aug-21				Sep-21				Oct-21				Nov-21				Dec-21																						
Week Commencing	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52															
Competition Priority																																																																			
Date of Events																																																																			
Name of Events <i>Please indicate competition (local/overseas), training camps, etc.</i>																																																																			
Key Performance Indicators <i>results, qualification, etc</i>																																																																			
Peaking Index (Please enter 1-10)	5	6	6	2	4	6	7	8	9	10	3	2	2	2	3	3	3	4	5	5	6	7	4	5	6	7	8	9	3	2	4	5	7	8	9	9	4	5	6	8	10	2	1	1	1	1	2	2	4	2	2	3	4														
Peaking Index Chart																																																																			
Coaching																																																																			
Technical																																																																			
Tactical																																																																			
Sports Science & Sports Medicine Support																																																																			
Physiology (Highlight service period required in maroon)																																																																			
Consultations/Planning																																																																			
Testing/Monitoring																																																																			
Travel Days																																																																			
Biomechanics (Highlight service period required in red)																																																																			
Technique Analysis																																																																			
Performance Analysis																																																																			
Travel Days																																																																			
Psychology (Highlight service period required in purple)																																																																			
Workshops																																																																			
Consultations																																																																			
Travel Days																																																																			
Nutrition (Highlight service period required in dark green)																																																																			
Workshops																																																																			
Consultations																																																																			
Travel Days																																																																			
Strength & Conditioning (Highlight service period required in sky blue)																																																																			
Strength Training																																																																			
Fitness Training																																																																			
Testing																																																																			
Travel Days																																																																			
Sports Medicine (Highlight service period required in orange)																																																																			
Screening																																																																			
Physiotherapy																																																																			
Massage																																																																			
Travel Days																																																																			
Athlete Career & Education // Athlete Life Management (Highlight service period required in brown)																																																																			
Athlete Life Planning Session																																																																			
Studentship/Workplace Support																																																																			
Leadership/Life Skills																																																																			
Community Engagement																																																																			
Travel Days																																																																			

Travel days refer to competition and/or training camp support

Guide to Completing the Yearly Planning Instrument

S/N	Field	Steps / Information	Remarks
1	Sport/NSA	Please enter your NSA name	
2	Name of Athlete/Team	Please enter the name of your athlete or team	
3	Month & Year	Please enter the month and year of YPI	e.g. Jan 2022 - Mar 2022
4	Long Term Goal (2 to 4 years)	Please state the overall long term goal of the athlete or team over the next two to four years.	
5	Month	Please enter event details below the respective month and week	
6	Date of Events	Please enter the specific date of competition (local/overseas), training camps etc.	
7	Name of Events	Please enter the name of the competition (local/overseas), training camps.	e.g. World Track Cycling Championships 2022
8	Key Performance Indicators	Please state the results, qualification, etc	e.g. Qualify for Asian Games 2022
9	Peaking Index	Please state the peaking index of values between 1 to 10 for each of the week	
10	Peaking Index Chart	Please note that the chart will be created based on the peaking index in S/N 9.	

Sample Example of a Yearly Planning Instrument

Month	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sept-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22									
Week Commencing	44	45	46	47	48	49	50	1	2	3	4	5	6	7	8	9	10									
Competition Priority																										
Date of Events							11-Apr							21-Nov												
Name of Events							Malvern Champs TT							26-Jun 27-Jul												
Key Performance Indicators							Rank 1							Rank 1.5 Rank 1.5												
Peaking Index (Please enter 1-10)	3	3	3	3	5	5	5	7	7	7	7	7	7	7	7	7	7									
Peaking Index Chart																										
Macro Cycle (Training Phases)			Pre Competition					Competition					Pre Competition													
Meso Cycle (Training Phases)			Foundation		Base			Build 1		Build 2		Taper	Build 1		Build 2		Taper	Foundation		Base						
Endurance			General			Event Specific					General			Event Specific												
Strength			Strength Endurance			Max		Taper			Max		Taper			Strength Endurance			Strength Endurance							
Power			Develop			Develop					Maintain			Develop		Maintain			Develop			Develop				
Technique			Emphasis			Develop					Minor Adjustmen			Develop		Minor Adjustmen			Emphasis			Emphasis				
Tactics			Acquire			Maintain					Apply			Maintain		Apply			Acquire			Acquire				
Mental			Short term goal			Review & Develop					Review & Develop					Short term goal			Review & Develop							
Flexibility			Develop			Emphasis					Maintain			Emphasis		Maintain			Develop			Develop				
Micro Cycle (Volume Light Blue) 1 Block = 5 hours (Intensity: Red) 1 (Low) 5 (High)	6																									
	5																									
	4																									
	3																									
	2																									
	1																									
% Percentage of Emphasis																										
Physical	60	60	60	60	70	70	70	70	75	75	75	80	80	80	80	80	75	75	60	60	60					
Psychological	15	15	15	15	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5	5	5					
Technical	20	20	20	15	15	15	15	10	10	10	10	10	10	10	10	10	10	10	10	10	10					
Tactical	5	5	5	5	5	5	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10					

REFERENCES

Chapter 1

- Singapore Cycling Federation. (2020). *Our story*. Retrieved 20 September 2020, from <https://www.cycling.org.sg/about/our-story/>

Chapter 3

- Lindsay, M. (2017, May 22). *5 essential cycling skills you need to know*. Map My Run. <https://blog.mapmyrun.com/5-essential-cycling-skills-need-know/>
- Sport Cycling Federation. (n.d.). *Singapore cycle safe programme, Level 2*.
- Sport Singapore (SportSG). (2017). *Safe cycling guide*. <https://www.sportsingapore.gov.sg/Sports-Education/Sports-Safety/Safety-Resources-and-Useful-Links>

Chapter 4

- Cycling Tips (2016, November 3). *Track cycling events, explained*. Retrieved September 23, 2020, from <https://cyclingtips.com/2016/11/track-cycling-events-explained/>
- Dersch, H. (2018, November 16). *Difference between BMX & Mountain bikes*. SportsRec. Retrieved September 23, 2020, from <https://www.sportsrec.com/5028346/difference-between-bmx-mountain-bikes>
- Palermo, A. (2020, June 1). *What is road cycling?* USA Cycling. Retrieved September 23, 2020, from <https://usacycling.org/article/what-is-road-cycling>
- UAE, R. B. (2019, August 18). *BMX vs. MTB: Which bike is best for you?* Redbull. Retrieved September 23, 2020, from <https://www.redbull.com/mea-en/bmx-vs-mtb-which-bike-is-best-for-you>

Chapter 5

- Denham, A. (2015, October 31). *Understanding bike fit: How does it work? Do you need one?* Cycling About. Retrieved October 28, 2020, from <https://www.cyclingabout.com/understanding-bike-fit/>
- Henrys, C. (2015, July 31). *Beginner's guide: How to set your saddle height on a road bike*. Road Cycling UK. Retrieved September 24, 2020, from <https://roadcyclinguk.com/how-to/technique/beginners-guide-how-to-set-your-saddle-height-on-a-road-bike.html>
- Sport Cycling Federation. (n.d.). *Singapore cycle safe programme, Level 2*.

Chapter 6

- Allen, J. (2020, May 13). *Starting and stopping smoothly*. Cycling Savvy. Retrieved October 25, 2020, from <https://cyclingsavvy.org/2020/05/starting-and-stopping/>
- Glassford, P. (2018, May 28). *3 drills to corner better on your bike*. Map My Run. Retrieved October 26, 2020, from <https://blog.mapmyrun.com/3-drills-to-corner-better-on-your-bike/>

Chapter 7

- Teo-Koh, S. M. (2010). *Fun, start, move smart: Fundamental movement skills for growing active learners*. Singapore Sports Council.

Chapter 8

- Arthurs-Brennan, M. (2020, July 2). *Common cycling injuries: Treatment and prevention*. Cycling Weekly. www.cyclingweekly.com/fitness/common-cycling-injuries-349671
- Diamond, A. (2017, May 1). *Avoiding youth sports burnout: How to keep your kids in the game*. My Southern Health. Retrieved December 2, 2020, from www.mysouthernhealth.com/youth-sports-burnout/
- Fleming, K. (2017, June 20). *There's an overuse injury epidemic in youth sports*. Market Watch. Retrieved December 2, 2020, from https://www.marketwatch.com/story/theres-an-overuse-injury-epidemic-in-youth-sports-2017-06-20?mod=mw_share_twitter
- Gambetta, V. (n.d.). *Growing the athlete*. iCoachKids. <https://www.icoachkids.eu/growing-the-athlete.html>
- iCoachKids (n.d.). *How children grow and develop*. <https://www.icoachkids.eu/how-children-grow-and-develop.html>
- National Youth Sports Institute. (n.d.). *Coaching resources*. Retrieved December 2, 2020, from <http://www.nysi.org.sg/youth-coaching/coaching-resources>
- UR Medicine (n.d.). *Cycling Injuries*. Retrieved December 2, 2020, from <https://www.urmc.rochester.edu/orthopaedics/sports-medicine/cycling-injuries.cfm#:~:text=The%20knee%20is%20the%20most>
- Whelan, T. Jr. (2017, April 19). *Study: 70 percent of kids stop playing sports by 13 years old*. USA Today High School Sports. <https://usatodayhss.com/2017/study-70-percent-of-kids-stop-playing-sports-by-13-years-old>
- Zeuwts, L., Vansteenkiste, P., Cardon, G., & Lenoir, M. (2016). Development of cycling skills in 7 to 12 year old children. *Traffic Injury Prevention, 17*(7). <https://doi.org/10.1080/15389588.2016.1143553>

Chapter 9

- Basketball for Coaches (n.d.). *How to be a good role model for your players*. Retrieved December 2, 2020, from <http://www.basketballforcoaches.com/being-a-role-model/>
- Bledsoe, J. (2017, March 06). *The responsibility and privilege of coaching youth sports*. Coach Up. <https://www.coachup.com/nation/articles/the-responsibility-and-privilege-of-coaching-youth-sports>
- Cook, B. (2013, October 25). *Why I coach youth sports*. *Forbes*. <https://www.forbes.com/sites/bobcook/2013/10/25/why-i-coach-youth-sports/?sh=38dafef43569>
- Council, M. R. (2017, January 30). *Become a youth sports coach, it'll make you a better person*. Good. <https://www.good.is/sports/benefits-coaching-youth-sports>
- Frith, J., & Sykes, R. (2017, January 4). *Put me in coach! Growth mindset in the world of sports*. Mindsetworks. <https://blog.mindsetworks.com/entry/put-me-in-coach-growth-mindset-in-the-world-of-sports>
- Grove, J. (2016, September 15). *4 steps to becoming role model coach*. Active for Life. Retrieved December 2, 2020, from <https://activeforlife.com/becoming-a-role-model-coach/>
- National Youth Sports Institute. (n.d.). *Coaching resources*. Retrieved December 2, 2020, from <http://www.nysi.org.sg/youth-coaching/coaching-resources>
- O'Sullivan, M. (2017, March 3). *State of play: Role of youth coach more challenging than ever*. *The Irish Times*. <https://www.irishtimes.com/sport/soccer/state-of-play-role-of-youth-coach-more-challenging-than-ever-1.2994044#.WLn72Xe2d0I.facebook>

Chapter 10

- Bourne, K. (n.d.). *Why Is goal setting important?* Believe Perform. <https://believeperform.com/why-is-goal-setting-important/>
- Bui, H. (2014, July 10). Fun — not winning — essential to keep kids in sports. *USA TODAY*. Retrieved December 2, 2020, from www.usatoday.com/story/news/nation/2014/07/10/sports-obesity-health-kids-youths-fun/12425155/
- Coach Logic (2016, December 13). *The future of sports coaching – a word from the experts*. Retrieved December 2, 2020, from <https://www.coach-logic.com/blog/future-of-sports-coaching/>
- Earhart, G. (2017, June 20). *Lessons from Justin, my first assistant*. SwimCloud. Retrieved December 2, 2020, from <https://www.swimcloud.com/news/2017/jun/20/lessons-from-justin-my-first-assistant/?referer=collegeswimming.com>
- Goldsmith, W. (n.d.). *Improving your coaching by not coaching*. WG Coaching. Retrieved December 2, 2020, from <https://wgcoaching.com/improve-your-coaching-by-not-coaching/>
- National Youth Sports Institute. (n.d.). *Coaching resources*. Retrieved December 2, 2020, from <http://www.nysi.org.sg/youth-coaching/coaching-resources>
- Singapore Cycling Federation. (2020). *SCF academy programme*. Retrieved September 20, 2020, from <https://www.cycling.org.sg/youth-development-programme/>
- Tan, N. (2017, March 11). Performance more crucial than results: Youth football expert. *Today Online*. Retrieved December 2, 2020, from <https://www.todayonline.com/sports/football/performance-more-crucial-results-youth-football-expert>
- Toh, W. L. (2017, July 13). The lives they live: Discipline the keyword for former Cedar sports coach. *The Straits Time*. Retrieved December 2, 2020, from <https://www.straitstimes.com/singapore/the-lives-they-live-discipline-the-keyword-for-former-cedar-sports-coach?xtor=CS3-18>

Chapter 11

- Fortson, J. (2020, August 17). *Energy systems used for cycling*. Trainer Road. Retrieved September 26, 2020, from <https://www.trainerroad.com/blog/energy-systems-used-for-cycling/>
- ptdirect (n.d.). *The aerobic system*. Retrieved September 26, 2020, from <https://www.ptdirect.com/training-design/anatomy-and-physiology/the-aerobic-system>

Chapter 12

- Bompa, T. O. (1999). *Periodization: Theory and Methodology of Training (4th ed.)*. Human Kinetics.
- Gibala, M. J., & Jones, A. M. (2013). Physiological and performance adaptations to high-intensity interval training. *Nestlé Nutrition Institute Workshop Serie*, 76, 51-60. <https://doi.org/10.1159/000350256>
- Gillen, J. B., & Gibala, M. J. (2014). Is high-intensity interval training a time-efficient exercise strategy to improve health and fitness? *Applied Physiology, Nutrition, and Metabolism*, 39 (3), 409-12. <https://doi.org/10.1139/apnm-2013-0187>
- Issurin, V. (2008) *Block periodization versus traditional training theory: A review*. *Journal of Sports Medicine and Physical Fitness*, 48(1), 65-75.

- Ronnestad, B.R., Hansen, J., & Ellefsen, S. (2012). Block periodization vs traditional training. *Scandinavia Journal of Medicine & Science in Sports*, 24(1), 34-42. <https://doi.org/10.1111/j.1600-0838.2012.01485.x>
- Skelly, L. E., Andrews, P. C., Gillen, J. B., et. al., (2014). High-intensity interval exercise induces 24-h energy expenditure similar to traditional endurance exercise despite reduced time commitment. *Applied Physiology, Nutrition, and Metabolism*, 39(7), 845-8. <https://doi.org/10.1139/apnm-2013-0562>

Chapter 13

- Cox, P. (2021, January 25). *What is the difference between MMP and FTP?* Wattbike. Retrieved February 2, 2021, from <https://support.wattbike.com/hc/en-gb/articles/115002905785-What-is-the-difference-between-MMP-and-FTP->
- Cycling Tips (2009, April 15). *Maximum aerobic power in cycling*. Retrieved September 23, 2020, from <https://cyclingtips.com/2009/04/maximum-aerobic-power-in-cycling/>
- High North (n.d.). *Polarised training: A comprehensive guide*. Retrieved September 23, 2020, from <https://www.highnorth.co.uk/articles/polarised-training-cycling>
- Sport Tracks (2015, October 5). *Critical power training: The fundamentals of power meter training for cyclists*. Retrieved September 26, 2020, from <https://sporttracks.mobi/blog/critical-power-training>
- Windsor, R. (2020, March 23). *What is FTP in cycling and how do I test and improve it?* Cycling Weekly. Retrieved November 23, 2020, from <https://www.cyclingweekly.com/fitness/ftp-cycling-363865>

Chapter 14

- Coggan, A. (n.d.). *Power training zones for cycling*. Training Peaks. Retrieved November 23, 2020, from <https://www.trainingpeaks.com/blog/power-training-levels/>
- Knott, P. (2020, April 30). *Cycling training zones: Power and heart rate zones explained*. Cycling Weekly. Retrieved November 23, 2020, from <https://www.cyclingweekly.com/fitness/training/training-zones-what-are-they-and-why-do-they-matter-180110>

Chapter 15

- Ryan, D. (2019, February 13). *5 performance tests for cyclists*. Map My Run. Retrieved November 23, 2020, from [https://blog.mapmyrun.com/5-performance-tests-for-cyclists/#:~:text=Critical%20power%20\(watts\)%20is%20an%20estimate%20of%20the,cyclists.%20Equipment:%20Indoor%20cycling%20bike%20with%20watts%20measurement](https://blog.mapmyrun.com/5-performance-tests-for-cyclists/#:~:text=Critical%20power%20(watts)%20is%20an%20estimate%20of%20the,cyclists.%20Equipment:%20Indoor%20cycling%20bike%20with%20watts%20measurement)
- Stuart, P. (2015, April 28). *What is a VO2Max test?* Cyclist. Retrieved November 22, 2020, from <https://www.cyclist.co.uk/in-depth/98/what-is-a-vo2-max-test>
- Training4Endurance (2020, June 23). *FTP cycling tests: How to measure and increase your FTP*. Retrieved November 22, 2020, from <https://training4endurance.co.uk/ftp-cycling-tests/#:~:text=Firstly,%20FTP%20is%20one%20of%20the%20most%20accessible,the%20willingness%20to%20push%20yourself,%20to%20your%20limit.>
- Windsor, R. (2020, March 23). *What is FTP in cycling and how do I test and improve it?* Cycling Weekly. Retrieved November 23, 2020, from <https://www.cyclingweekly.com/fitness/ftp-cycling-363865>

Chapter 16

- De Vroet, M. (2017, October 3). *How much benefit do we really get from drafting?* Cycling Tips. Retrieved November 20, 2020, from <https://cyclingtips.com/2017/10/much-benefit-really-get-drafting/>
- Lindsay, M. (n.d.). *8 core exercises every cyclist should do.* Active. Retrieved November 20, 2020, from <https://www.active.com/cycling/articles/8-core-exercises-every-cyclist-should-do/slide-7>
- Liv (n.d.). *How to sprint on a road bike.* Retrieved November 20, 2020 from: <https://www.liv-cycling.com/global/campaigns/how-to-sprint-on-a-road-bike/22303>
- Robinson, J. (2018, July 13). *Peloton drafting even more efficient than we first thought, new study finds.* Cyclist. Retrieved November 20, 2020, from <https://www.cyclist.co.uk/news/5018/peloton-drafting-even-more-efficient-than-we-first-thought-new-study-finds>
- Yeager, S. (2016, March 28). *6 ways to avoid fading on a long ride.* Bicycling. Retrieved November 20, 2020, from <https://www.bicycling.com/training/a20019710/6-ways-to-avoid-fading-on-a-long-ride/>

Chapter 17

- Irvine, H. (2015, August 10). *How to: Maintain and clean your bike in 10 easy steps.* Total Women's Cycling. Retrieved October 29, 2020, from <https://totalwomenscycling.com/commuting/commuting-hints-tips/how-to-maintain-and-clean-your-bike-in-10-easy-steps>
- MTBR. (2018, October 26). *Muc-off ultimate bicycle cleaning kit – reviewed.* Retrieved October 29, 2020, from <https://reviews.mtbr.com/muc-off-ultimate-bicycle-cleaning-kit-reviewed>
- Rei Coop (n.d.). *Bike maintenance basics.* Retrieved October 29, 2020, from <https://www.rei.com/learn/expert-advice/bike-maintenance.html>
- The Geeky Cyclist. (2020, March 10). *7 basic bike maintenance tips for all cyclists.* Retrieved October 29, 2020, from <https://www.thegeekycyclist.com/tips/basic-bike-maintenance/>

Chapter 18

- Child Protection in Sport Unit (2018, October 5). *Sample codes of conduct for parents, children and staff.* Retrieved December 10, 2020, from <https://thecpsu.org.uk/resource-library/policies/sample-codes-of-conduct-for-parents-children-and-staff/>
- Singapore Athletics Association. (2019, August 20). *Athlete's code of conduct.* Retrieved December 10, 2020, from <https://www.singaporeathletics.org.sg/athletes-code-of-conduct>
- Sport Singapore (SportSG). (n.d.). *Coach's code of ethics.* <https://www.sportsingapore.gov.sg/Athletes-Coaches/Coaches-Corner/Code-of-Ethics>

ACKNOWLEDGEMENTS

The SCF National Cycling Syllabus was developed over an eight-month period – from the initial conceptualisation in August 2020 and the final publication in March 2021. It would not have been possible for the Singapore Cycling Federation (SCF) to develop the Syllabus without the contributions and assistance rendered by the following organisations and individuals:

School of Business Management, Nanyang Polytechnic, in particular, Senior Lecturer, Miss Tok Lee Ching, her colleagues and students from Diploma in Sport & Wellness Management Teaching Enterprise Project Team

National Youth Sports Institute

Sport Singapore

Hairul Nazwa Bin Dol, National BMX Coach and Academy Director, SCF

Adrian Ng, Head Coach and General Manager, ProCyclingSG, SCF

Mr Shayne Bannan, High Performance Director, SCF

Mr Mahipal Singh, General Manager, SCF