# The Science of Hurdling

*Hurdling by the Numbers*

**Mike Gipson**
**Highlands High School 1981 – 1994**
**Sacramento State 1997 – 2004**
**University of California Berkeley 2007 - 2019**

## Sprint Hurdle Specifications

| Race Distance | # of Hurdles | Distance to Start – 1st | Distance Between | Last Hurdle To Finish | Hurdle Height |
|---|---|---|---|---|---|
| **Men** | | | | | |
| 110m | 10 | 13.72m | 9.14m | 14.02m | 99 cm (39") |
| 110m | 10 | 13.72m | 9.14m | 14.02m | 106.7 cm (42") |
| **Women** | | | | | |
| 100m | 10 | 13m | 8.50m | 10.50m | 84 cm (33") |
| 100m | 10 | 13m | 8.50m | 10.50m | 84 cm (33") |
| **These Specifications for Age Group Competition** | | | | | |
| 80m | 8 | 12m | 8m | 12m | 76 cm (30") |
| 80m | 8 | 12m | 8m | 12m | 84cm (33") |
| 100m | 10 | 12m | 8.50m | 10.50m | 91.5 cm (36") |

2

## Sprint Hurdle Race Specifications

**MEN 110m HURDLES**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | Finish |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.72m | 9.14m | 9.14m | 9.14m | 9.14m | 9.14m | 9.14m | 9.14m | 9.14m | 9.14m | 14.02m | |

**WOMEN 100m HURDLES**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | Finish |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13m | 8.50m | 8.50m | 8.50m | 8.50m | 8.50m | 8.50m | 8.50m | 8.50m | 8.50m | 10.50m | |

3

## What are We Working With?

- **# of Strides to Hurdle #1** **8**
- **# of Hurdle Clearance Strides** **10**
- **# of Strides between hurdles** **27**
- **# of Strides from H10 to Finish** **6/7**
- **TOTAL # OF STRIDES** **51/52**
- **Distance to Hurdle #1** **13m/13.72m**
- **Distance between Hurdles** **8.50m/ 9.14m**
- **Distance off H10 to finish** **10.50m/14.02m**

4

**The Hurdles Race can be roughly divided into the following sections:**

- Start Section or Approach Run
- Clearance Stride(s) including Take-Off
- Flight Phase
- Landing Phases
- Run Between Hurdles
- Run In

5

## Start or Approach Run

- **Maximal Acceleration on the approach to the first hurdle with visual control from the 5th stride onward.**
- **Hitting the optimal take-off point for each hurdle.**
- **Minimize vertical velocity or lift at take off. (Run TALL)**

6

**Stride Pattern**
**8 -vs- 7 Step Pattern**

| 8 – Stride Pattern Start to First Hurdle #1 | | | | |
|---|---|---|---|---|
| MEN | | | WOMEN | |
| Stride Length | Accel. Distance | | Stride Length | Accel. Distance |
| .65m | .65m | 1st Stride | .60m | .60m |
| 1.24m | 1.89m | 2nd Stride | 1.16m | 1.76m |
| 1.36m | 3.25m | 3rd Stride | 1.33m | 3.09m |
| 1.46m | 4.71m | 4th Stride | 1.43m | 4.52m |
| 1.60m | 6.31m | 5th Stride | 1.53m | 6.05m |
| 1.74m | 8.05m | 6th Stride | 1.63m | 7.68m |
| 1.84m | 9.89m | 7th Stride | 1.73m | 9.41m |
| 1.74m | 11.63m | 8th Stride | 1.63m | 11.04m |

7

**Stride Pattern**
**8 -vs- 7 Step Pattern**

| 7 – Stride Pattern Start to First Hurdle #1 | | | | |
|---|---|---|---|---|
| MEN | | | WOMEN | |
| Stride Length | Accel. Distance | | Stride Length | Accel. Distance |
| .76m | .76m | 1st Stride | .65m | .65m |
| 1.42m | 2.18m | 2nd Stride | 1.40m | 2.05m |
| 1.62m | 3.80m | 3rd Stride | 1.60m | 3.65m |
| 1.77m | 5.57m | 4th Stride | 1.75m | 5.40m |
| 1.93m | 7.50m | 5th Stride | 1.85m | 7.25m |
| 2.08m | 9.58m | 6th Stride | 1.95m | 9.20m |
| 2.00m | 11.58m | 7th Stride | 1.85m | 11.05m |

8

**Stride Pattern**
**8 -vs- 7 Step Pattern**

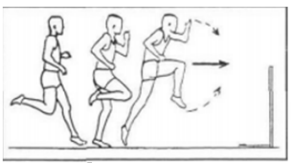
9

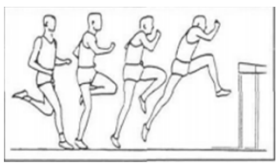
**The Take-Off**

- Run TALL
- Prevent Center of Gravity from sinking during Support Contact.
- Cut Step!! Active Touchdown on the Ball of the Foot. Foot contact under Center of Mass (CM) to Prevent Braking.
- Lead with a driving knee and a well flexed lead leg.
- When the trail leg leaves the ground it must be fully extended and in alignment with the head and the trunk.
- The forearm of the lead arm often appears more or less flexed across the body, but it is necessary that it be directed forward.
- The body's center of mass (CM) is higher than the hurdle crossbar.

10

**The Take-Off**





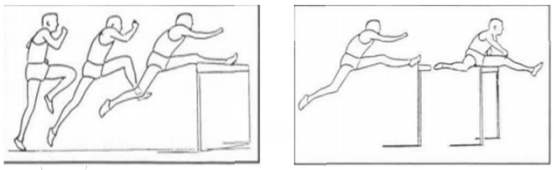
11

**The Flight Phase**

- Flight towards the Hurdle Cross Bar
- Flight towards the top rail begins when the takeoff foot breaks contact with the ground.
- Flight Phase ends when either the toe or the heel of the lead foot reaches the top rail of the hurdle.
- Split Phase assumes a Split Position at the end of the Flight towards the Hurdle.
- Clearance phase lasts from this moment until the trail fool has crossed the hurdle.
- Peak Point of the flight Parabola is IN FRONT OF the Hurdle.

12

## The Flight Phase



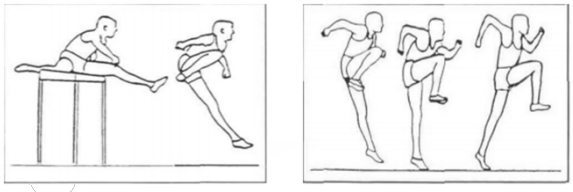
13

## The Landing Phase

- The hurdle sitting position is assumed for a very short period leading smoothly into the Landing Preparation Phase.
- The Landing Phase begins when either the toe or the heel of the lead foot, reaches the top rail of the hurdle.
- Over the hurdle, the lead leg has already started its downward movement and the trail.
- While the trail leg is still flexed, executing a forward and upward movement, the lead leg is extended and actively pressed downwards. A "scissors" Movement.
- Trunk maintains a slight forward lean.
- Active Landing on Ball of Foot with Positive Foot Speed.

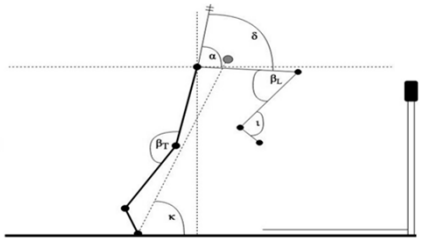
14

## The Landing Phase



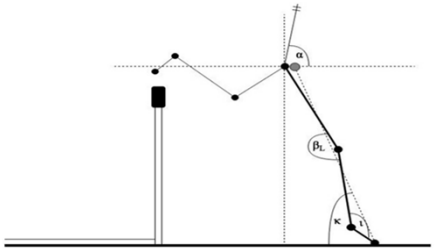
15

## Angular Mechanics at Toe Off




16

## Angular Mechanics at Touchdown




17

**ANGULAR KINEMATICS**

- **Trunk angle (α)** Trunk angle relative to the horizontal at the point of TO of takeoff phase and TD and TO of the landing phase (considered to be 90° in the upright position).
- **Trunk-thigh angle (δ)** Angle between the trunk and the thigh of the leading leg at TO of the take-off phase (considered to be 180° in the anatomical standing position).
- **Lead leg knee angle (βL)** Thigh-shank angle of the leading leg at the point of TO of takeoff phase and TD of the landing phase (considered to be 180° in the anatomical standing position).
- **Lead leg ankle angle (ι)** Shank-foot angle of the leading leg at the point of TO of takeoff phase and TD of the landing phase (considered to be 90° in the anatomical standing position).
- **Trail leg knee angle (βT)** Thigh-shank angle of the leg in contact with the ground at TO of the take-off phase (considered to be 180° in the anatomical standing position).
- **Deviation angle (κ)** Angle between ground contact point and CM relative to the horizontal (considered to be 90° in the upright position).

18

| Men 110h Final 2017 Toe-Off | | | | Ave | Low |
|---|---|---|---|---|---|
| Lead leg knee angle (βL) | 77 | 74 | 76 | 74 | 69 |
| Lead leg ankle angle (ι) | 119 | 115 | 121 | 109 | 94 |
| Trail leg knee angle (βT) | 154 | 169 | 168 | 160 | 154 |
| Trunk-thigh angle (δ) | 70 | 54 | 69 | 68 | 54 |
| Trunk angle (α) | 76 | 64 | 72 | 73 | 63 |
| Deviation angle (κ) | 64 | 64 | 65 | 64 | 61 |

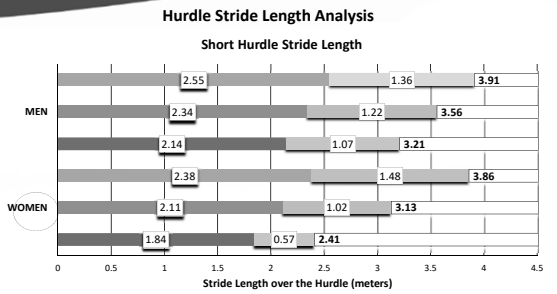
| Men 110h Final 2017 Touchdown | | | | Ave | Low |
|---|---|---|---|---|---|
| Lead leg knee angle (βL) | 177 | 176 | 169 | 166 | 150 |
| Lead leg ankle angle (ι) | 140 | 144 | 134 | 130 | 144 |
| Deviation angle (κ) | -79 | -80 | -76 | -80 | -76 |

19

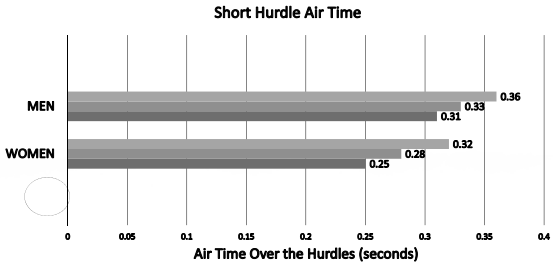
| Women 100h Final 2017 Toe-Off | | | | Ave | Low |
|---|---|---|---|---|---|
| Lead leg knee angle (βL) | 68 | 53 | 64 | 70 | 53 |
| Lead leg ankle angle (ι) | 107 | 96 | 116 | 103 | 80 |
| Trail leg knee angle (βT) | 162 | 156 | 155 | 158 | 141 |
| Trunk-thigh angle (δ) | 89 | 75 | 68 | 78 | 68 |
| Trunk angle (α) | 75 | 71 | 67 | 71 | 67 |
| Deviation angle (κ) | 67 | 63 | 63 | 63 | 59 |

| Women 100h Final 2017 Touchdown | | | | Ave | Low |
|---|---|---|---|---|---|
| Lead leg knee angle (βL) | 173 | 150 | 153 | 155 | 148 |
| Lead leg ankle angle (ι) | 140 | 128 | 122 | 126 | 118 |
| Deviation angle (κ) | -80 | -84 | -77 | -79 | -74 |

20




21




22

## Run Between the Hurdles

- At the touchdown after each hurdle, the lead leg must be relatively straight.
- Maintain Hip Height at Touchdown. DO NOT SINK!
- This posture is achieved by the touchdown under or behind the Center of Mass and having the "trail leg toes" up.
- Power and speed can be gained from the trail leg, which is the more important leg to drive away from the hurdle and re-accelerate.
- The arms are recovered into a "running action" position very similar to a sprint.
  - Shuffle -vs- Long/Short/Long/Short -vs- Sprint

23

**Touchdown Times**

| Men 110m Hurdles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Target Time | Start H-1 | H-2 | H-3 | H-4 | H-5 | H-6 | H-7 | H-8 | H-9 | H-10 | Finish |
| 13.5 | 2.5 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 13.5 |
| | | 3.5 | 4.5 | 5.5 | 6.6 | 7.7 | 8.8 | 9.9 | 11.0 | 12.1 | |
| 13.7 | 2.5 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 13.7 |
| | | 3.5 | 4.5 | 5.6 | 6.7 | 7.8 | 8.9 | 10.0 | 11.1 | 12.3 | |
| 14.0 | 2.5 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 14.0 |
| | | 3.6 | 4.7 | 5.8 | 6.9 | 8.0 | 9.1 | 10.2 | 11.4 | 12.6 | |
| 14.5 | 2.6 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 14.5 |
| | | 3.7 | 4.8 | 5.9 | 7.0 | 8.2 | 9.4 | 10.6 | 11.8 | 13.0 | |
| 15.0 | 2.7 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 15.0 |
| | | 3.9 | 5.1 | 6.3 | 7.5 | 8.7 | 9.9 | 11.1 | 12.3 | 13.5 | |
| 15.5 | 2.7 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 15.5 |
| | | 3.9 | 5.1 | 6.3 | 7.5 | 8.8 | 10.1 | 11.4 | 12.7 | 14.0 | |
| 16.0 | 2.7 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 16.0 |
| | | 4.0 | 5.3 | 6.6 | 7.9 | 9.2 | 10.5 | 11.8 | 13.1 | 14.4 | |

24

**Touchdown Times**

| Women 100m Hurdles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Target Time | Start H-1 | H-2 | H-3 | H-4 | H-5 | H-6 | H-7 | H-8 | H-9 | H-10 | Finish |
| 13.4 | 2.5 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 13.4 |
| | | 3.5 | 4.5 | 5.6 | 6.7 | 7.8 | 8.9 | 10.0 | 11.1 | 12.2 | |
| 14.0 | 2.5 | 1.0 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 14.0 |
| | | 3.5 | 4.6 | 5.7 | 6.8 | 8.0 | 9.2 | 10.4 | 11.6 | 12.8 | |
| 14.5 | 2.5 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 14.5 |
| | | 3.6 | 4.8 | 6.0 | 7.2 | 8.4 | 9.6 | 10.8 | 12.0 | 13.3 | |
| 15.0 | 2.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 15.0 |
| | | 3.9 | 5.1 | 6.3 | 7.5 | 8.7 | 9.9 | 11.1 | 12.4 | 13.7 | |
| 15.5 | 2.7 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 15.5 |
| | | 3.9 | 5.1 | 6.3 | 7.6 | 8.9 | 10.2 | 11.5 | 12.8 | 14.1 | |
| 16.0 | 2.8 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 16.0 |
| | | 4.0 | 5.3 | 6.6 | 7.9 | 9.2 | 10.5 | 11.8 | 13.1 | 14.5 | |

25

Train to Run Goal Rhythm Units (RU)

(Target Touchdown Times)

| | |
|---|---|
| Hurdle PR = | 15.00 sec |
| Time to H1 = | 2.7 sec |
| Time off H10 = | 1.5 sec |
| Time H1 – H10= | 10.80 |
| Avg R U for 9 Hurdles = | 1.20 sec = *(10.80 / 9)* |
| Avg Velocity for R U's = | 7.62 m/s |
| | V=*distance/time* |
| | 82.3m / 10.80 = 7.62 m/s |

Set up Hurdle Drill at 7.62m

26

Train to Run Goal Rhythm Units (RU)

(Target Touchdown Times)

| | |
|---|---|
| Hurdle PR = | 14.00 sec |
| Time to H1 = | 2.5 sec |
| Time off H10 = | 1.4 sec |
| Time H1 – H10= | 10.10 |
| Avg R U for 9 Hurdles = | 1.12 sec = *(10.10 / 9)* |
| Avg Velocity for R U's = | 8.15 m/s |
| | V=*distance/time* |
| | 82.3m / 10.10 = 8.15 m/s |

Set up Hurdle Drill at 8.15m

27

Train to Run Goal Rhythm Units (RU)

(Target Touchdown Times)

| | |
|---|---|
| Hurdle PR = | 15.00 sec |
| Time to H1 = | 2.6 sec |
| Time off H10 = | 1.3 sec |
| Time H1 – H10= | 11.10 |
| Avg R U for 9 Hurdles = | 1.23 sec = *(11.10 / 9)* |
| Avg Velocity for R U's = | 6.89 m/s |
| | V=*distance/time* |
| | 76.5m / 11.10 = 6.89 m/s |

Set up Hurdle Drill at 6.89m

28

Train to Run Goal Rhythm Units (RU)

(Target Touchdown Times)

| | |
|---|---|
| Hurdle PR = | 13.80 sec |
| Time to H1 = | 2.5 sec |
| Time off H10 = | 1.2 sec |
| Time H1 – H10= | 10.10 |
| Avg R U for 9 Hurdles = | 1.12 sec *(10.10 / 9)* |
| Avg Velocity for R U's = | 7.57 m/s |
| | V=*distance/time* |
| | 76.5m / 10.10 = 7.57 m/s |

Set up Hurdle Drill at 7.57m

29

| Elements of Hurdle Training | |
|---|---|
| Race Length | • Hurdle Acceleration<br>• Hurdle Speed<br>• Hurdle Endurance |
| Inter-Hurdle Stride Length | • Stride Length (Women: 1.83m/Men: 2.04m) |
| Hurdle Rhythm | • Technical Rhythm (1-2 Strides)<br>• Common Race Rhythm (3 Strides<br>• Lengthened Rhythm (5-7 Strides)<br>• Varied Rhythm (3 Stride, 5 Stride, 7 Stride) |
| Inter-Hurdle Spacing | • 3-Stride Rhythm (8.5m/9.14m)<br>• 5-Stride Rhythm (12.16m/13.23m)<br>• 7-Stride Rhythm (15.83m/17.32m) |
| Hurdle Height | • Low Hurdles (30cm=12"/45cm=18"/68cm=27")<br>• Medium Hurdles (76cm=30"/83cm=33"/91cm=36")<br>• High Hurdles (99cm=39"/106cm=42") |
| Approach Distance | • Shortened Approach (5-6 Strides)<br>• Standard Approach(7-8 Strides)<br>• Lengthened Approach (8-12 Strides) |

30

## Teaching the Sprint Hurdles

**Hurdle Speed**

**Men Hurdle Speed**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13.72m | 8.88m | 8.88m | 8.88m | 8.70m | 8.70m | 8.70m | 8.50m | 8.50m | 8.50m | |

**Women Hurdle Speed**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13m | 8.20m | 8.20m | 8.20m | 8.05m | 8.05m | 8.05m | 7.90m | 7.90m | 7.90m | |

31

## Teaching the Sprint Hurdles

**Hurdle Endurance**

**Men 12 Hurdle Drill**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.72m | 8.8m | 8.8m | 8.8m | 8.8m | 8.8m | 8.8m | 8.8m | 8.5m | 8.5m | 8.5m | 8.5m | |

**Women 12 Hurdle Drill**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13m | 8m | 8m | 8m | 8m | 8m | 8m | 8m | 7.9m | 7.9m | 7.9m | 7.9m | |

32

## Teaching the Sprint Hurdles

**Hurdle Rhythm**

**Men Inter-Hurdle Stride Length**

| Start | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10m | X | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m | 2.04m |

**Women Inter-Hurdle Stride Length**

| Start | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10m | X | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m | 1.83m |

33

## Teaching the Sprint Hurdles

**Hurdle Rhythm**

**Men Hurdle Varied Rhythm**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 |
|---|---|---|---|---|---|---|---|---|---|
| 13.72m | **9.14m** | **13.23m** | **9.14m** | **9.14m** | **13.23m** | **9.14m** | **13.23m** | **9.14m** | |

**Women Hurdle Varied Rhythm**

| Start | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 |
|---|---|---|---|---|---|---|---|---|---|
| 13m | **8.50m** | **12.16m** | **8.50m** | **8.50m** | **12.16m** | **8.50m** | **12.16m** | **8.50m** | |

34

| | |
|---|---|
| **Hurdle Acceleration** | • *2 x 1h + 2 x 2h +2 x 3h w: 33" @ 8.50m m: 42" @ 9.14m*<br>• *2 x 3h + 2 x3h w: 30" then 33" m: 39" then 42"* |
| **Hurdle Speed** | • *3(2 x 5h) w: 30" @ 8.50m m: 42" @ 9.14m*<br>• *2 x 4h + 2 x 5h + 2 x 6h w: 30" @ 8.50m m: 42" @ 9.14m* |
| **Hurdle Endurance** | • *3(2 x 12h) w: 8.50m -1' to -2' m: 9.14m -1' to -2'*<br>• *2 x 6h @ 5-strides + 2 x 12h + 2 x 10h*<br>*w: @ 12.16m m: @ 13.23m* |
| **Varying Rhythms** | • *4 x 7h (3-5-3-3-5-3 strides)*<br>*w: @ 8.50m/12.16m m: @ 9.14m/13.23m*<br>• *4 x8h (3-3-5-3-3-5-3 strides)*<br>*w: @ 8.50m/12.16m m: @ 9.14m/13.23m* |
| **Height Variation** | • *3x10h w: @ 33"/30"/27" m: @ 42"/39"/36"*<br>• *4 x 8h w: @ 33"/30"/27" m: @ 42"/39"/36"* |

35

## Long Hurdle Specifications

| Race Distance | # of Hurdles | Distance to Start – 1st | Distance Between | Last Hurdle To Finish | Hurdle Height |
|---|---|---|---|---|---|
| **Women/Men** | | | | | |
| **300m** | 8 | 45m | 35m | 10m | 76 cm (30") |
| **300m** | 8 | 45m | 35m | 10m | 91.5 cm (36") |
| **Women/Men** | | | | | |
| **400m** | 10 | 45m | 35m | 40m | 76 cm (30") |
| **400m** | 10 | 45m | 35m | 40m | 91.5 cm (36") |
| **Youth Boys/Girls** | | | | | |
| **200m** | 5 | 20m | 35m | 40m | 76 cm (30") |
| **200m** | 5 | 20m | 35m | 40m | 76 cm (30") |

36

## The Long Hurdler

The Long Hurdles is a Specific-Speed, Strength, and Endurance Event

The ideal type of long hurdler possesses three different abilities:
- Speed
- Endurance
- Rhythm

This sort of athlete is theoretical only, because even the best hurdlers have good and not-so-good aspects of motor and technique preparation.

37

## The Long Hurdler

Long Hurdlers can be classified into 3 groups

- Special Endurance Group
  - Excellent flat 400m runners
- Technical Group
  - Technical Sprint Hurdles athlete.
  - Able to adapt hurdle speed to hurdle endurance.
- Rhythm Group
  - "Pure" Long Hurdler without 400m flat and technical hurdle preferences

38

## The Long Hurdler

Special Endurance Group
In the training process we start from the general "culture of hurdling"
i.e. walking, skipping, jogging hurdles.
Sometimes we must choose only a "one-leg" hurdle rhythm pattern.

Technical Group
Can have very good technique of one leg and very poor of the other.
Problems is arise when the right leg is the lead leg.
In most cases we choose a 13 or 15 or 17 stride pattern.

Rhythm Group
"Rhythm" hurdlers have effective technique with both legs.
We can adapt various stride patterns (13 or 14 or 15 or 16)

39

## The Long Hurdles

### Components of the Long Hurdles

The Long Hurdles race can be broken up into four stages:

- Start to First Hurdle
- Movement Across Hurdle
  - On Straight
  - On Curve
- Running Between Hurdles
- Last Hurdle to Finish

40

## The Long Hurdles

**START TO FIRST HURDLE**

- Block Setting depends on choice of Lead Leg over first Hurdle
- Number of Strides to First Hurdle
  - Men: 20 – 23
  - Women: 22 – 25
- Sight Hurdle by 30m mark
- Make any slight adjustments
- Attack from 10m out to minimize deceleration
- Center of Gravity is raised only as is necessary to clear the hurdle
- Trunk lean should be enough to maintain sprint technique

41

## The Long Hurdles

**MOVEMENT OVER HURDLES**

**On the Straight**
- The action is similar to that required for the sprint hurdler but does not need to be as vigorous, due to the lower height of the hurdles.
- Negotiate the hurdle with minimum deviation from normal sprinting technique.
- The hurdler should follow the basics of good sprinting, not over striding or reaching.
- The hurdler should reach the highest point prior to the hurdle, so that the body is on its way down as it crosses the hurdle.
- At touchdown, the athlete's center of mass should be directly over or slightly ahead of the lead foot to minimize braking.

42

## The Long Hurdles

**On the Curve**

It is preferable to hurdle on the curve using a left leg lead:

- The athlete is able to keep closer to the line and therefore runs a shorter distance.
- There is less chance of being disqualified by dragging the trail foot over the side of the hurdle.
- The athlete can counteract the effect of centrifugal force by leaning to the left. whereas a right leg lead hurdler, attempting a similar lean, is in danger of the left knee hitting the hurdle or the athlete being forced to hurdle higher, wasting valuable energy.
- Hurdling with a right leg lead on a curve requires the athlete to move to the center or hurdle downhill

43

## The Long Hurdles

**Stride Pattern Between the Hurdles**

- Success requires a stride pattern that fits smoothly into the 35m between the hurdles.
- This pattern depends on the athlete's lead leg, race plan, and natural stride length.
- Use as few strides as possible without over striding.
- Ideally an odd number of steps between all hurdles.
- A transition may take place when a hurdler changes down to a shorter stride length on the curve or due to fatigue, which results in one or two more steps between hurdles

44

## Specific Rhythm Chart

| Exercise | Stride Pattern | # Steps | Hurdle Spacing | Approach |
|---|---|---|---|---|
| I | 16 pattern | 7 | 17.00m | 15m |
| | 15 pattern | 7 | 17.90m | 15m |
| | 14 pattern | 7 | 19.00m | 15m |
| | 13 pattern | 7 | 20.20m | 15m |
| II | 16 pattern | 9 (8) | 21.00m (19.00) | 30m |
| | 15 pattern | 9 | 22.20m | 30m |
| | 14 pattern | 9 (8) | 23.50m (21.20) | 30m |
| | 13 pattern | 9 | 25.10m | 30m |
| III | 16 pattern | 11 (10) | 25.00m (23.00) | 30m |
| | 15 pattern | 11 | 26.40m | 30m |
| | 14 pattern | 11 (10) | 28.10m (25.80) | 30m |
| | 13 pattern | 11 | 30.00m | 30m |
| IV | 16 pattern | 13 (12) | 29.00m (27.00) | 30m |
| | 15 pattern | 13 | 30.70m | 30m |
| | 14 pattern | 13 (12) | 32.70m (30.40) | 30m |

45

**400m Hurdles**
**Specific Rhythm**

| Steps = | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100% : Of Normal Spacing in meters for Men | | | | | | | | | | | | |
| 13 | 20.55 | 22.96 | 25.37 | 27.78 | 30.18 | 32.59 | 35.00 | | | | | |
| 14 | 19.35 | 21.59 | 23.82 | 26.06 | 28.29 | 30.53 | 32.76 | 35.00 | | | | |
| 15 | 18.31 | 20.39 | 22.48 | 24.57 | 26.65 | 28.74 | 30.83 | 32.91 | 35.00 | | | |
| 16 | 17.39 | 19.35 | 21.31 | 23.26 | 25.22 | 27.18 | 29.13 | 31.09 | 33.04 | 35.00 | | |
| 17 | 16.59 | 18.43 | 20.27 | 22.11 | 23.95 | 25.79 | 27.64 | 29.48 | 31.32 | 33.16 | 35.00 | |
| 18 | 15.87 | 17.61 | 19.35 | 21.09 | 22.83 | 24.57 | 26.31 | 28.04 | 29.78 | 31.52 | 33.26 | 35.00 |

46

**400m Hurdles**
**Specific Rhythm**

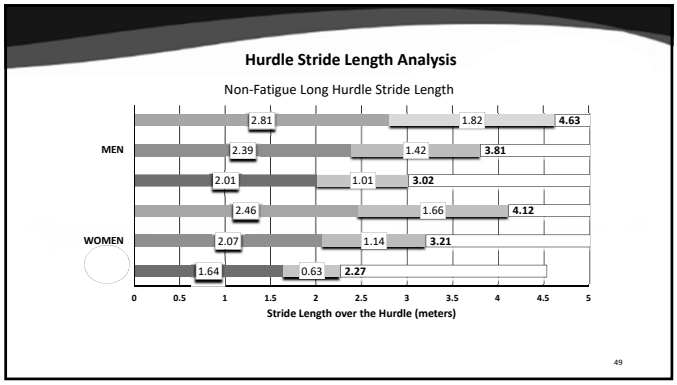
| Steps = | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90% : Of Normal Spacing in meters for Men | | | | | | | | | | | | |
| 13 | 18.50 | 20.67 | 22.83 | 25.00 | 27.17 | 29.33 | 31.50 | | | | | |
| 14 | 17.42 | 19.43 | 21.44 | 23.45 | 25.46 | 27.48 | 29.49 | 31.50 | | | | |
| 15 | 16.48 | 18.35 | 20.23 | 22.11 | 23.99 | 25.87 | 27.74 | 29.62 | 31.50 | | | |
| 16 | 15.65 | 17.42 | 19.18 | 20.94 | 22.70 | 24.46 | 26.22 | 27.98 | 29.74 | 31.50 | | |
| 17 | 14.93 | 16.59 | 18.24 | 19.90 | 21.56 | 23.21 | 24.87 | 26.53 | 28.19 | 29.84 | 31.50 | |
| 18 | 14.29 | 15.85 | 17.42 | 18.98 | 20.55 | 22.11 | 23.68 | 25.24 | 26.81 | 28.37 | 29.94 | 31.50 |

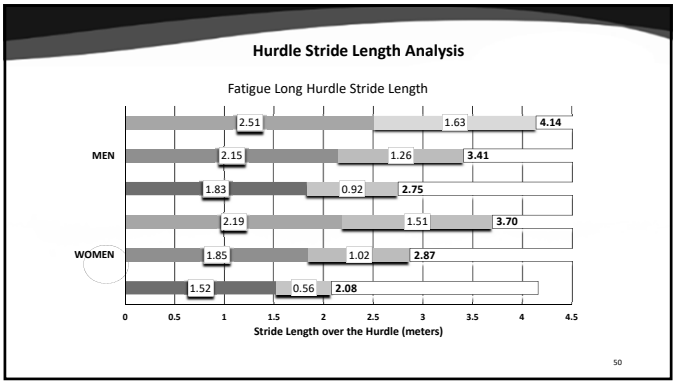
47

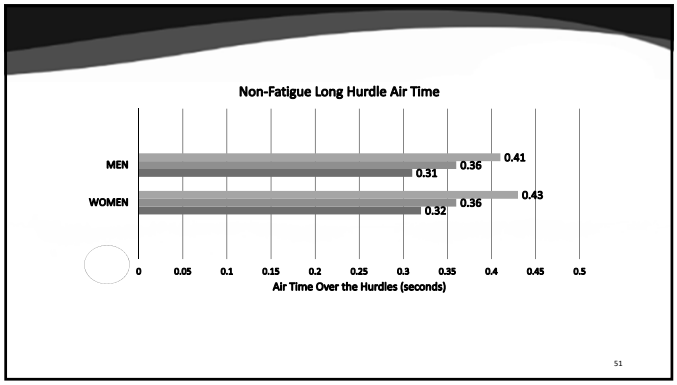
**400m Hurdles**
**Specific Rhythm**

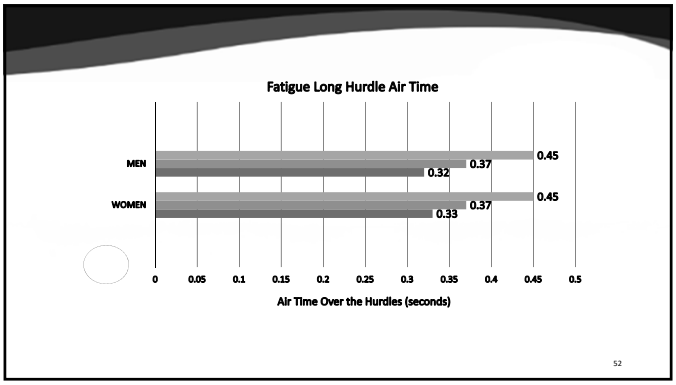
| Steps = | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85% : Of Normal Spacing in meters for Men | | | | | | | | | | | | |
| 13 | 17.47 | 19.52 | 21.56 | 23.61 | 25.66 | 27.70 | 29.75 | | | | | |
| 14 | 16.45 | 18.35 | 20.25 | 22.15 | 24.05 | 25.95 | 27.85 | 29.75 | | | | |
| 15 | 15.56 | 17.33 | 19.11 | 20.88 | 22.66 | 24.43 | 26.20 | 27.98 | 29.75 | | | |
| 16 | 14.78 | 16.45 | 18.11 | 19.77 | 21.44 | 23.10 | 24.76 | 26.42 | 28.09 | 29.75 | | |
| 17 | 14.10 | 15.67 | 17.23 | 18.80 | 20.36 | 21.93 | 23.49 | 25.06 | 26.62 | 28.19 | 29.75 | |
| 18 | 13.49 | 14.97 | 16.45 | 17.93 | 19.40 | 20.88 | 22.36 | 23.84 | 25.32 | 26.79 | 28.27 | 29.75 |

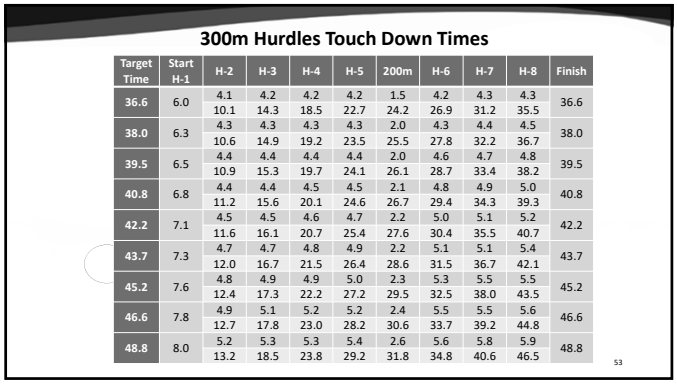
48



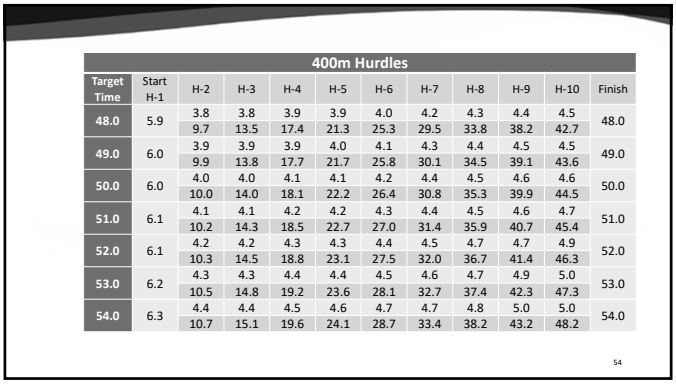



### 300m Hurdles Touch Down Times

| Target Time | Start H-1 | H-2 | H-3 | H-4 | H-5 | 200m | H-6 | H-7 | H-8 | Finish |
|---|---|---|---|---|---|---|---|---|---|---|
| 36.6 | 6.0 | 4.1 | 4.2 | 4.2 | 4.2 | 1.5 | 4.2 | 4.3 | 4.3 | 36.6 |
| | | 10.1 | 14.3 | 18.5 | 22.7 | 24.2 | 26.9 | 31.2 | 35.5 | |
| 38.0 | 6.3 | 4.3 | 4.3 | 4.3 | 4.3 | 2.0 | 4.3 | 4.4 | 4.5 | 38.0 |
| | | 10.6 | 14.9 | 19.2 | 23.5 | 25.5 | 27.8 | 32.2 | 36.7 | |
| 39.5 | 6.5 | 4.4 | 4.4 | 4.4 | 4.4 | 2.0 | 4.6 | 4.7 | 4.8 | 39.5 |
| | | 10.9 | 15.3 | 19.7 | 24.1 | 26.1 | 28.7 | 33.4 | 38.2 | |
| 40.8 | 6.8 | 4.4 | 4.4 | 4.5 | 4.5 | 2.1 | 4.8 | 4.9 | 5.0 | 40.8 |
| | | 11.2 | 15.6 | 20.1 | 24.6 | 26.7 | 29.4 | 34.3 | 39.3 | |
| 42.2 | 7.1 | 4.5 | 4.5 | 4.6 | 4.7 | 2.2 | 5.0 | 5.1 | 5.2 | 42.2 |
| | | 11.6 | 16.1 | 20.7 | 25.4 | 27.6 | 30.4 | 35.5 | 40.7 | |
| 43.7 | 7.3 | 4.7 | 4.7 | 4.8 | 4.9 | 2.2 | 5.1 | 5.1 | 5.4 | 43.7 |
| | | 12.0 | 16.7 | 21.5 | 26.4 | 28.6 | 31.5 | 36.7 | 42.1 | |
| 45.2 | 7.6 | 4.8 | 4.9 | 4.9 | 5.0 | 2.3 | 5.3 | 5.5 | 5.5 | 45.2 |
| | | 12.4 | 17.3 | 22.2 | 27.2 | 29.5 | 32.5 | 38.0 | 43.5 | |
| 46.6 | 7.8 | 4.9 | 5.1 | 5.2 | 5.2 | 2.4 | 5.5 | 5.5 | 5.6 | 46.6 |
| | | 12.7 | 17.8 | 23.0 | 28.2 | 30.6 | 33.7 | 39.2 | 44.8 | |
| 48.8 | 8.0 | 5.2 | 5.3 | 5.3 | 5.4 | 2.6 | 5.6 | 5.8 | 5.9 | 48.8 |
| | | 13.2 | 18.5 | 23.8 | 29.2 | 31.8 | 34.8 | 40.6 | 46.5 | |

53



### 400m Hurdles

| Target Time | Start H-1 | H-2 | H-3 | H-4 | H-5 | H-6 | H-7 | H-8 | H-9 | H-10 | Finish |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 48.0 | 5.9 | 3.8 | 3.8 | 3.9 | 3.9 | 4.0 | 4.2 | 4.3 | 4.4 | 4.5 | 48.0 |
| | | 9.7 | 13.5 | 17.4 | 21.3 | 25.3 | 29.5 | 33.8 | 38.2 | 42.7 | |
| 49.0 | 6.0 | 3.9 | 3.9 | 3.9 | 4.0 | 4.1 | 4.3 | 4.4 | 4.5 | 4.5 | 49.0 |
| | | 9.9 | 13.8 | 17.7 | 21.7 | 25.8 | 30.1 | 34.5 | 39.1 | 43.6 | |
| 50.0 | 6.0 | 4.0 | 4.0 | 4.1 | 4.1 | 4.2 | 4.4 | 4.5 | 4.6 | 4.6 | 50.0 |
| | | 10.0 | 14.0 | 18.1 | 22.2 | 26.4 | 30.8 | 35.3 | 39.9 | 44.5 | |
| 51.0 | 6.1 | 4.1 | 4.1 | 4.2 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 | 4.7 | 51.0 |
| | | 10.2 | 14.3 | 18.5 | 22.7 | 27.0 | 31.4 | 35.9 | 40.7 | 45.4 | |
| 52.0 | 6.1 | 4.2 | 4.2 | 4.3 | 4.3 | 4.4 | 4.5 | 4.7 | 4.7 | 4.9 | 52.0 |
| | | 10.3 | 14.5 | 18.8 | 23.1 | 27.5 | 32.0 | 36.7 | 41.4 | 46.3 | |
| 53.0 | 6.2 | 4.3 | 4.3 | 4.4 | 4.4 | 4.5 | 4.6 | 4.7 | 4.9 | 5.0 | 53.0 |
| | | 10.5 | 14.8 | 19.2 | 23.6 | 28.1 | 32.7 | 37.4 | 42.3 | 47.3 | |
| 54.0 | 6.3 | 4.4 | 4.4 | 4.5 | 4.6 | 4.7 | 4.7 | 4.8 | 5.0 | 5.0 | 54.0 |
| | | 10.7 | 15.1 | 19.6 | 24.1 | 28.7 | 33.4 | 38.2 | 43.2 | 48.2 | |

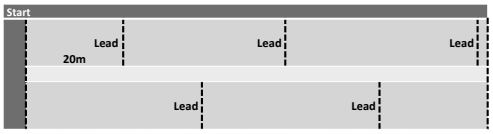
54

**400m Hurdles**

| Target Time | Start H-1 | H-2 | H-3 | H-4 | H-5 | H-6 | H-7 | H-8 | H-9 | H-10 | Finish |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55.0 | 6.4 | 4.6 | 4.6 | 4.7 | 4.7 | 4.8 | 4.9 | 5.0 | 5.0 | 5.0 | 55.0 |
| | | 11.0 | 15.1 | 19.8 | 24.5 | 29.3 | 34.2 | 39.2 | 44.2 | 49.2 | |
| 57.0 | 6.6 | 4.7 | 4.7 | 4.8 | 4.8 | 4.9 | 5.0 | 5.1 | 5.2 | 5.2 | 57.0 |
| | | 11.3 | 16.0 | 20.8 | 25.6 | 30.5 | 35.5 | 40.6 | 45.8 | 51.0 | |
| 59.0 | 6.8 | 4.8 | 4.9 | 5.0 | 5.1 | 5.1 | 5.2 | 5.2 | 5.3 | 5.3 | 59.0 |
| | | 11.6 | 16.5 | 21.5 | 26.6 | 31.7 | 36.9 | 42.1 | 47.4 | 52.7 | |
| 61.0 | 6.9 | 5.1 | 5.1 | 5.2 | 5.2 | 5.3 | 5.3 | 5.4 | 5.4 | 5.4 | 61.0 |
| | | 12.0 | 17.1 | 22.3 | 27.5 | 32.8 | 38.1 | 43.5 | 48.9 | 54.3 | |
| 62.0 | 7.0 | 5.2 | 5.2 | 5.3 | 5.3 | 5.4 | 5.4 | 5.5 | 5.5 | 5.6 | 62.0 |
| | | 12.2 | 17.4 | 22.7 | 28.0 | 33.4 | 38.8 | 44.3 | 49.8 | 55.2 | |
| 63.0 | 7.1 | 5.2 | 5.3 | 5.3 | 5.4 | 5.5 | 5.5 | 5.6 | 5.6 | 5.7 | 63.0 |
| | | 12.3 | 17.6 | 22.9 | 28.3 | 33.8 | 39.3 | 44.9 | 50.5 | 56.2 | |
| 64.0 | 7.3 | 5.3 | 5.3 | 5.4 | 5.4 | 5.5 | 5.6 | 5.6 | 5.7 | 5.9 | 64.0 |
| | | 12.6 | 17.9 | 23.3 | 28.7 | 34.2 | 39.8 | 45.4 | 51.1 | 57.0 | |

55

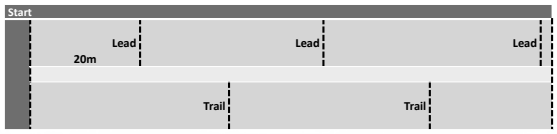
## Teaching the Long Hurdles




*4-6-8 Stride Hurdle Variation. Lead or Trail Leg Isolation*

56

## Teaching the Long Hurdles

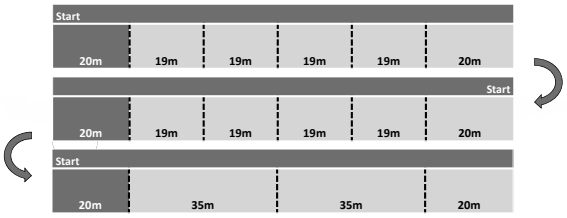



*3-5-7 Stride Hurdle Variation. Isolation Exercise*

57

## Teaching the Long Hurdles

**Swiss Turn-About Drill**




58

## Endurance Session

| Type of Hurdler | Period | | |
|---|---|---|---|
| | General (Indoor) | Specific | Competition |
| "Special Endurance" | 4 x 500m @ 90% {i = 6:00-8:00} or 3(500m + 300m) @ 85 – 90% {i = 6:00 – 8:00} | 2(500m + 300m) @ 90 – 95% {i = 8:00/15:00} or 500m+400m+300m+200m @ 95% {i = 12:00} | 500m + 300m @ 98% {i = 18:00} or 2(350m + 150m) @ 98% {I= 5:00/15:00} |
| "Technical" | 3(300m + 200m) @ 90% {i = 6:00 – 8:00} or 3(200m + 150m + 100m) @ 90% {i = 3:00/12:00} | 5 x 300m @ 95% {i = 10:00} or 4(200m + 150m) @ 90% {i = 5:00/12:00} | 300m+200m+150m @ 985 {i = 15:00} or 2x250m+2x200m+ 2x150m) @ 98% {i = 8:00/12:00} |
| "Rhythm" | 8 x 350m @ 85% {i = 6:00} or 4(350m + 250m) @ 85 – 90% {i = 5:00/8:00} | 5(200m + 60mH + 200m) @ 95% {i = 1:00/10:00} or 5(2x150m + 60mH) @ 95% {i = 1:00/12:00} | 2(200mH + 200m) + 2(200m + 150mH) @ 98% {i = 1:00/12:00} or (150m+150mH+150m) + (2x150m+150mH) + (150mH + 200m) @ 98% {i = 1:30/15:00} |

59

## Technical Session

| Type of Hurdler | Period | | |
|---|---|---|---|
| | General (Indoor) | Specific | Competition |
| "Special Endurance" | 2(300m/90% + 60mH/4-strides) {i = :30s/8:00} + 3(2 x 60mH/5-stride + 200m/90%) {i = :30s/8:00} | 4(300mH *cut 1'-2' same leg. {i = 10:00} or 4(150mH same leg + 150m/90% + 150mH alternating) {i = 1:00/12:00} | 8h + 300m flat + 6h {i = 12:00} or 350mH + 350m flat {i = 20:00} |
| "Technical" | 2(150m + 1x60mH/5-stride weak leg+1x60mH good leg) + (1x60mH good leg + 1x60mH bad leg + 150m) {i = :30s/8:00} | 4(2 x 200mH/7-stride 1st time weak leg, 2nd time good leg) {I = 3:00/12:00} | 6H + 2x 150m + 4H {I = 10:00/6:00/15:00} or 6H (15-stride) + 6h (16-stride *+2') + 5H (15-stride) {i = 12:00} |
| "Rhythm" | Shuttle Runs 6 x 2(60mH/5-stride left leg + 60mH alternate leg + 60mH left leg) {i = :30s/8:00} | 3(12H *450mH) {i = 12:00} or 4(H1-H5 + flat run + H8-H10) {i = 12:00} | 1 x 8H, 1 x 7H, 1 x 6H {i = 15:00} or 2 x 9H {i = 20:00} |

60

**Sample Training Week – Specific Prep**

| MON | TUE | WED | THU | FRI | SAT | SUN |
|---|---|---|---|---|---|---|
| Power Development | Strength Endurance | Recovery or Activity | Sprint Development | Tempo Endurance | Rest | Rest |
| Sprint Development | Lactacid Power | | Hurdle Skill | Race Modeling | | |
| Hurdle Skill | | | Weights | | | |
| Weights | | | | | | |

61

**Sample Training Week – Competition**

| MON | TUE | WED | THU | FRI | SAT | SUN |
|---|---|---|---|---|---|---|
| Power Development | Strength Endurance | Recovery or Activity | Sprint Development | Tempo Endurance | Competition | Rest |
| Sprint Development | Lactacid Power | | Hurdle Skill | Race Modeling | | |
| Hurdle Skill | | | Weights | | | |
| Weights | | | | | | |

62

**Video Analysis Software/Apps**

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hudl

Coach's Eye

DARTFISH
SEE. LEARN. SUCCEED.

63

**The Science of Hurdling**

gipsonmb@gmail.com
916-743-8153

**Thank You!!**

64