HURDLES

LEARN ADJUST IMPROVE

Alexander Hill

sprints and hurdles coach

LEARNING SPEED INTELLIGENTLY

"I go to practice on time, I complete all my workouts, I go to every lifting session, I go to my treatment every time I need, I get in the cold tub and just take care of my body," .

"I just do all the things I need to be great. It takes that wake-up call, realizing that, 'OK, I could really be exceptionally well, not just good, I could be exceptionally well if I watch my diet, rest my body, hydrate my body, take care of those things off the track that benefit you on the track."

***~Brianna Rollins** [NCAA/American record Holder]*

100 METER OF PURE !@#$%

How It All Adds Up

8 Strides to first hurdle

10 Hurdle clearance strides

27 Strides between hurdles

6 strides from last hurdle to finish

51 total strides

UNDERSTANDING THE OBJECTIVE

- Hurdling is a sub-set of sprinting. Speed Development (Sprinting) is Primary
- Technical Development (Hurdling Mechanics) is Secondary
- Women's 100 Meter Hurdles is roughly 70% Sprinting / 30% Hurdling
- Training Volume should reflect that and be within 30%-40%
- Weekly volume looks like 3 – 3.5 units, including race day

TRAINING SPECIFICS

1. **Sprinting**: Acceleration, Velocity
2. **Hurdling**: Functional and Specific Movement, Rotary Motion
3. **Strength**: Core, Hips, Hamstrings, Glutes, Adductors
4. **Power**: Strength In the Context Of Motion
5. **Flexibility**: Full and Functional ROM
6. **Coordination & Rhythm**: Timing, Proprioception

TRAINING INVENTORY

- **Fitness** Circuits, Cross-Functional, Prehabilitation, Aerobic Capacity
- **Weight Training**: Strength Related, Olympic Lifts, Auxiliary Lifts
- **Sprint Drills**: Accelerated SL, Max Velocity, Dynamic Speed Drills
- **Plyometrics**: Eccentric(absorption), Concentric, Speed Bounds
- **Multi-Jumps/Throws** Medicine Ball, Shot
- **Hurdle Drills**: Hip Rotation and Recovery, Inter-Hurdle Drills

TRAINING CONCEPTS

- Performance Modeling
- Discounting Hurdle Height
- Discounting Hurdle Spacing
- Contrast Training
- Specific Strength Development

FLIGHT TIMES (HURDLE CLEARANCE)

Note: Flight Times are identical at almost every hurdle and don't depend on the acceleration phase. Therefore Mechanics are important but secondary compared to inter-hurdle time and its only important to the degree in which it affects your inter-hurdle speed.

	Elite High School	**Elite Collegiate**	**World Class**
	13.70	12.80	12.38
Flight Time over hurdles in sec	0.32-0.34	0.30-0.32	0.28-.031
	0.02	0.02	0.03
Time from Hurdle to Hurdle (RU's)	1.06-1.12	0.98-1.07	0.90-1.01

Only minimal gains can be made trying to improve hurdle flight time. An improvement in hurdle time is possible when an improvement is made in an athletes speed. An increase in speed is best utilized through inter-hurdle stride rate where significant gains can be made.

It is important to note that the hurdle clearance height has some significance and is generally relative to performance. The take-off is a key factor because it affects the angle of travel, which determines the distance in landing (touchdown), which affects the speed into the next hurdle, which again will affect the take-off and height.

Clearance Height	Performance in sec
22-20”	18.0
20-18”	17.5
18-16”	17.0
16-14”	16.0
14-12”	15.0
12-10”	14.5
10-8”	14.0
8-6”	13.5
6-4”	13.0
4-2”	12.5

PERFORMANCE MODELING

Performance Evaluation

Developing	*100 + 2.0*
Intermediate	*100 + 1.5*
Elite	*100 + 1.0*

First Hurdle Philosophy: Patterning an 8 step accelerated strength length to the first hurdle and Patterning a 3 step inter-hurdle stride recovery.

4 step acceleration pattern:	Start Line|.60|1.65|2.95|4.40|T.O.|h1 6.35
6 step acceleration pattern:	Start Line|.60|1.65|2.95|4.40|5.95|7.60|T.O.|h1 9.35
8 step acceleration pattern:	Start Line|.60|1.65|2.95|4.40|5.95|7.60|9.35|11.05|T.O.|h1 13
8 step acceleration pattern:	Start Line|.58|1.76|3.01|4.39|5.88|7.52|9.26|10.97|T.O.|h1 13

3 step inter-hurdle stride**|** - 1.08m - **Touchdown** - 1.62m - **1stp** - 1.92m - **2stp** - 1.77m -**3stp |**

DISCOUNTING HURDLE HEIGHT

All hurdles should be first taught with hurdles at a reduced height to patterning in the action of hurdling and is always reduced for performance modeling.

Girls Hurdle Reduction: 18", 21", 24" 27" 30"

Elite = little or no reduction of height
Developmental = liberal Reduction of height

DISCOUNTING HURDLE SPACING

All hurdles should be first taught with hurdles at a reduced spacing to patterning in a rhythm and is almost always reduced for performance modeling with the exception of 5 stride inter-hurdle training.

Example: Progressive spacing W1 for hurdling development (+0.5)

- H1 12.40 13.00
- H2 20.25(7.85) 21.50
- H3 28.15(7.90) 30.00
- H4 36.10(7.95) 38.50
- H5 44.10(8.00) 47.00
- H6 52.10(8.00) 55.00
- H7 60.15(8.05) 64.00
- H8 68.25(8.10) 72.50

Example: Progressive Spacing W2 for hurdling development (+0.5)

- H1 12.70 13.00m
- H2 20.70(8.00) 21.50m
- H3 28.75(8.05) 30.00m
- H4 36.85(8.10) 38.50m
- H5 45.00(8.15) 47.00m
- H6 53.20(8.20) 55.50m
- H7 61.40(8.20) 64.00m
- H8 69.60(8.20) 72.50m

Example: Progressive Spacing W3 for hurdling development (+.25)

- H1 13.00 13.00m
- H2 20.50(7.50) 21.50m
- H3 28.25(7.75) 30.00m
- H4 36.25(8.00) 38.50m
- H5 44.50(8.25) 47.00m
- H6 52.75(8.25) 55.50m
- H7 61.00(8.25) 64.00m
- H8 69.25(8.25) 72.50m

Example: Progressive Spacing W4 for speed hurdling development (-.05)

- H1 13.00 13.00m
- H2 21.25(8.25) 21.50m
- H3 29.45(8.20) 30.00m
- H4 37.60(8.15) 38.50m
- H5 45.70(8.10) 47.00m
- H6 53.75(8.05) 55.50m
- H7 61.75(8.00) 64.00m
- H8 69.75(8.00) 72.50m

Example: Progressive Spacing W4 for speed hurdling development (-.25)

- H1 13.00 13.00m
- H2 21.50(8.50) 21.50m
- H3 29.75(8.25) 30.00m
- H4 37.75(8.00) 38.50m
- H5 45.50(7.75) 47.00m
- H6 53.00(7.50) 55.50m
- H7 60.50(7.50) 64.00m
- H8 68.00(7.50) 72.50m

Example: Progressive Spacing W4 for speed hurdling development (-.10)

- H1 13.00 13.00m
- H2 21.00(8.00) 21.50m
- H3 28.90(7.90) 30.00m
- H4 36.70(7.80) 38.50m
- H5 44.40(7.70) 47.00m
- H6 52.00(7.60) 55.50m
- H7 59.50(7.50) 64.00m
- H8 67.00(7.50) 72.50m

CONTRAST TRAINING

Simultaneous of low and regulation hurdling (25% - 50% hurdle reduction)
Therefore two separate lanes with different hurdle heights are required.

Contrast by hurdle height	Contrast by hurdle spacing
18” versus 21”	7.50 versus 7.75
18” versus 24”	7.75 versus 8.00
18” versus 27”	8.00 versus 8.25
27” versus 30”	8.25 versus 8.50
30” versus 33”	

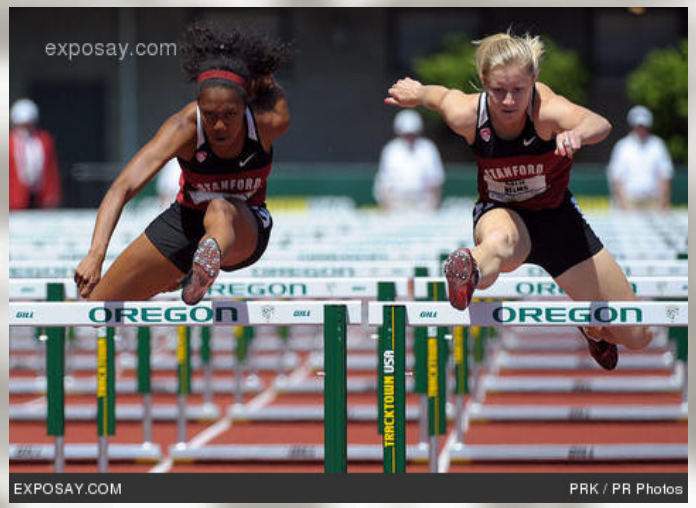
CONTRAST TRAINING METHODS

- Contrast with hurdles and without hurdles
- Contrast hurdling versus sprinting (adj. lanes) – good for teaching hurdle acceleration
- Contrast Sub-Maximal and Maximal intensities
- Contrast Starts: “call” versus no “call”
- Contrast Starts: solo versus group

TEACHING PART – PART - WHOLE

Hurdling is a determinant value. It consists of various parts that are trained separately and then introduced into a whole. The action of hurdling is partitioned into different training emphasis such as the approach, take-off, hurdle clearance, inter-hurdle stride recovery and the touchdown. Each part is taught in a responsible progression and put together in a continuous action.

HURDLE MECHANICS



HURDLE MECHANICS

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Arm Action

- Lead arm never cross the body but should punch forward
- Lead arm should open and cross midline slightly
- Lead arm should cut-off trail leg knee
- Trail arm should stay at the hip in a sprint position

Lead Leg Action

- Lead leg should go with the knee first towards the hurdle
- Lead leg falls due to the trail leg coming forward changing the center of gravity
- Creates a quick rhythm where the trail leg hits the ground as close to the lead leg as possible

HURDLE MECHANICS

Trail Leg Action

- Trail leg is not swung outward from the body
- Heel should be brought forward to the butt
- Knee should take a high path under the arm pit
- Trail leg should exchange with less rhythm and more power

Velocity

- Max speed is never really attained
- Minimize deceleration (move through it!)
- Create speed after each hurdle jump

HURDLE MECHANICS

Key points

- Head is always up-looking toward the next hurdle
- Chest over thigh (dive over hurdle) and kept forward moving through the hurdle
- Forward lean at takeoff transfers vertical momentum into a flat, parabolic flight.
- Forward Lean must be kept through touchdown to maintain forward velocity.
- Arm leads the legs into speed, rhythm and technique
- Should hold breath between hurdle to apply sprint force to the track
- Attack the track not the hurdle

HURDLE DRILLS

Hurdle drills are taught in the context of performance. These drills are Awareness Activities that are design to pattern in specific movements and should be taught at sub maximal intensities before maximal intensities. Seek to stabilize before increasing stimulus

Hip Rotation and Recovery

- Wall Drills (leg rotation)
- Quick Walk overs (leg exchange)
- Walk thru the hands
- Re-acceleration step drill
- One step drill
- Single hurdle Soft approach / re-acceleration drill
- Lead Leg run / Trail Leg Runs (sub maximal and maximal intensity)

Inter-hurdle and Frequency

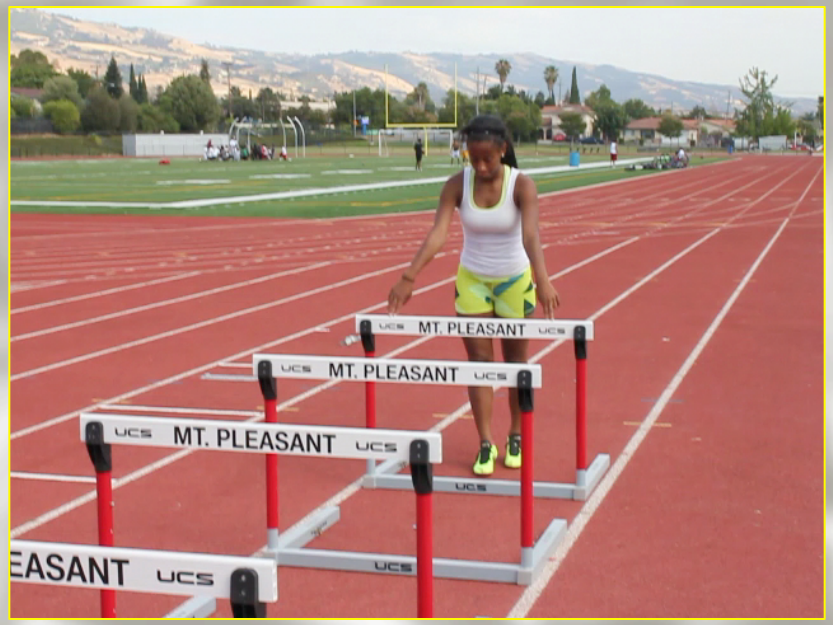
- Quick Step Drills / Dribble run
- 3 stride cadence drill
- Speed Skirts (inter-muscular)

HURDLE DRILLS

WALL DRILL

- Toe Out
- Knee Under the armpit
- Swing around to 12 O'clock
- Stab back

STEP THROUGHL DRILL



- Arms outside shoulders
- Hip up, Knee up, Toe Up
- Chest forward and Step through arms
- Pull TL Through arms, Chest forward
- Stab back

HURDLE DRILLS

RE-ACCELERATION STEP

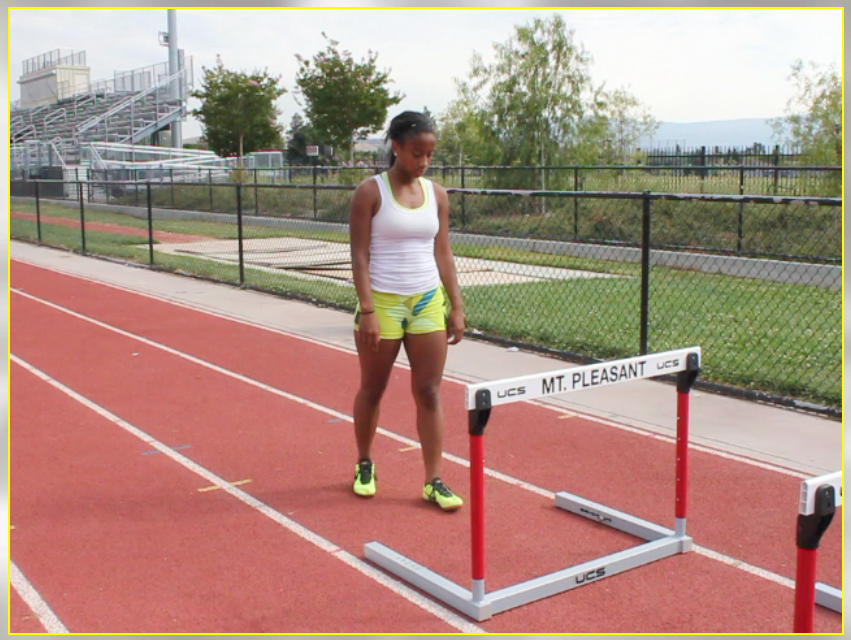
- Progression of step through drill
- Step through arms
- Reaccelerate off trail leg

RE-ACCELERATION DRILL

- Progression of re-acceleration drill
- Performed with stepping thru hands
- Simulate continuation off the hurdle

HURDLE DRILLS

QUICK WALKOVER DRILL



- Chess forward, lead with the arms
- Step quickly thru hurdles
- Quick and coordinated leg exchange
- Builds Rhythm Awareness

ONE STEP DRILL

- Limited range of recovery
- Move quickly thru the hurdles
- Controlling the action of hurdling

HURDLE DRILLS

DRIBBLE RUN 2’

- Segmental frequency Drills
- Meant to meet performance demands
- Cycle foot quickly over ankles
- Gradually increasing speed

DRIBBLE RUN 4’

- Segmental frequency Drills
- Meant to meet performance demands
- Cycle foot quickly over Calves
- Gradually increasing speed

HURDLE DRILLS

3 STEP CADENCE RUN

- Limited range of recovery
- Simulate restricted sprint stride
- Quick ground strike between hurdles
- Simulate the action of hurdling

SPEED BOUNDING

- Strength in the context of motion
- Absorbing and applying force
- Quick and Explosive leg exchange

SPECIFIC TRAINING EMPHASIS

Approach Modeling

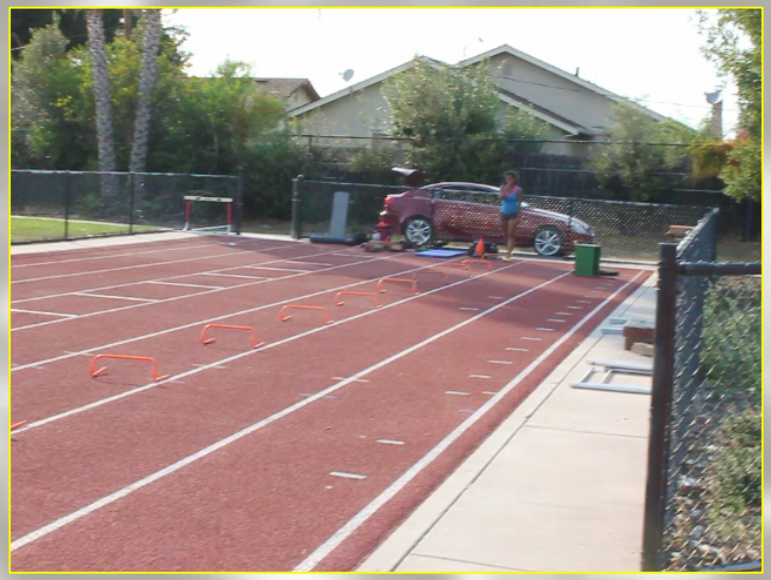
- Block Exit
- Acceleration
- Stabilizing an 8 step approach
- Developing Consistency
- Bottom to Top approach
- Optimal Take-Off Patterning

HURDLE DRILLS

BLOCK EXIT

- Control and balanced start
- Consistent Stride Pattern
- Get to running tall quickly
- Attack the track, create speed

ACCELERATION



- Development of stride length and frequency
- Developing good postural Integrity
- Hip height and ground strike
- Performed at full effort

HURDLE DRILLS

4 STEP APPROACH

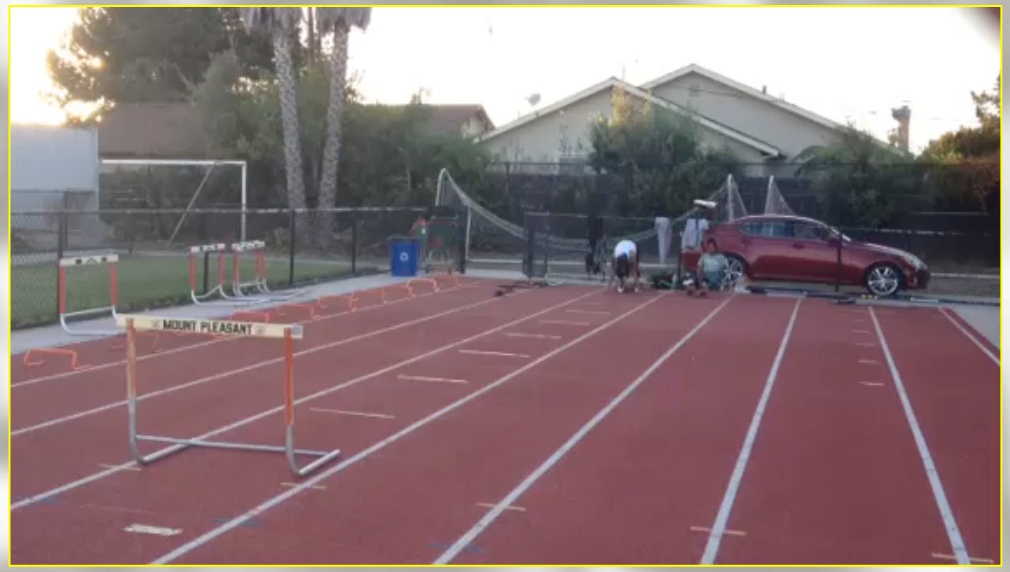
- Building in rhythm awareness
- Developing push mechanics
- Working Bottom to top transition
- Developing take-off mechanics

6 STEP APPROACH

- Building in rhythm awareness
- Developing a consistent stride pattern
- Minimizing deceleration at take-off
- Learning to move through the hurdle

HURDLE DRILLS

8 STEP APPROACH



- Building in rhythm awareness
- Developing a consistent stride pattern
- Minimizing deceleration at take-off
- Learning to move through the hurdle

SPECIFIC TRAINING EMPHASIS CON'T

Rhythm Unit Recording

- Create High Velocity to and through the 1st hurdle
- First hurdle touchdown Timing and Velocity
- Take-off / Touchdown (coaches marks)
- Inter-hurdle Rhythm Units and Velocity
- Run-in timing and Velocity

TOUCHDOWN TIME & VELOCITY

Touchdown behind first hurdle		Hurdle Units		Run-In	
Time (sec)	Velocity (m/sec)	Time (sec)	Velocity (m/sec)	Time (sec)	Velocity (m/sec)
2.55	5.51	1	8.5	1.1	8.59
2.56	5.49	1.01	8.42	1.11	8.51
2.57	5.47	1.02	8.33	1.12	8.44
2.58	5.45	1.03	8.25	1.13	8.36
2.59	5.42	1.04	8.17	1.14	8.29
2.6	5.4	1.05	8.1	1.15	8.22

TOUCHDOWN TIME & VELOCITY

Women 100 Meter Hurdles										
Touchdown Times										
	1H1	1H2	1H3	1H4	1H5	1H6	1H7	1H8	1H9	1H10
13.52	2.69	3.79	4.85	5.89	6.93	7.98	9.06	10.16	11.26	12.37
		1.10	1.06	1.04	1.03	1.06	1.08	1.10	1.10	1.11
13.59	2.71	3.81	4.87	5.92	6.96	8.02	9.10	10.21	11.31	12.43
		1.10	1.06	1.05	1.04	1.06	1.08	1.10	1.10	1.12
13.66	2.72	3.83	4.90	5.95	7.00	8.06	9.15	10.26	11.37	12.49
		1.11	1.07	1.05	1.04	1.07	1.09	1.11	1.11	1.12
13.73	2.73	3.85	4.92	5.98	7.03	8.10	9.20	10.31	11.43	12.55
		1.12	1.07	1.06	1.05	1.07	1.09	1.12	1.12	1.13
13.80	2.75	3.87	4.95	6.01	7.07	8.14	9.24	10.36	11.48	12.62
		1.12	1.08	1.07	1.05	1.08	1.10	1.12	1.12	1.13

OTHER TRAINING EMPHASIS

Strength Training

- Prehabilitation exercises
- Bilateral, Unilateral and Contralateral Strength Related Exercises
- Olympic Lifts: Cleans, Snatch, Dead Lift
- Resistance Drills (sleds)
- Muscular Endurance Drills
- Specific Strength Drills

OTHER TRAINING EMPHASIS CON'T

Plyometrics

- Box Jumps
- Hurdle Hops
- Sandpit Jumps
- Straight Leg Bounding
- Speed Bounding

OTHER TRAINING EMPHASIS CON'T

Speed Development

- Acceleration Stride Length Drills (banana hurdles) (full effort)
- Maximum Velocity Drills (banana hurdles) (full effort)
- 20's, 30's, 40's, 50's, 60's Sprint Drills (100% effort)
- Up Hills / Down Hills
- Ultra Speed Towing
- In and outs
- Sprint Drills: Marches, Fast Legs Rotary, Foot Fires, Foot Claws, Half Starts

OTHER TRAINING EMPHASIS CON'T

Speed Endurance Development

- General 100, 150, 200 repeats (90 – 100% effort)
- 120, 150, 180 Sprints (90 – 100% effort)
- 3x 12 Hurdles with 7.5 spacing
- 5x 5h 5 step drills with 11.25m spacing

MISCONCEPTIONS

- Hurdlers are not high jumpers. They do not jump over hurdlers. The sprint over them.
- Lead Leg should never lead with the foot (punt). The knee should lead first into the hurdle with the leg and then foot opening up after.
- Leading with the chess forward, the lead leg should be cued to snap down and back towards the hurdle to quickly get the foot under the center of mass.
- Although it's called a Trail Leg (on take-off) the leg should never trail behind the lead leg in a slow movement. A quick leg exchange should occur with the trail leg developing a high path for the trail knee and shorter recovery.
- The lead arm should never come across the body but should instead punch forward. The trail arm should stay in the hip area similar to sprinting.
- No progress can be attained during flight. The objective is to get your feet back on the ground and reduce ground contact time. The faster you get your feet on the ground the faster your rate of acceleration.

COMMON MISTAKES

- Decelerates at the hurdle
- Decelerates after touchdown
- Insufficient lean into the hurdle
- Off Balance at touchdown
- Trail leg foot is above knee
- Straight Arm Paddle
- Failure to 3 step during inter-hurdle stride
- Athletes emphasis is on rhythm instead of power and speed
- Lack of speed in the flat

THINGS TO KNOW

- Objective is to attain a high velocity from the first hurdle and through the race
- Acceleration should continue through the first 4 hurdles and end at hurdle 5-6
- Deceleration happens after hurdle 5-6, therefore technique must be maintained
- Key factors in attaining high velocity is maximal strength and speed strength
- max strength is utilized for acceleration to the first hurdle
- speed strength is utilized for consistency in the segment times through all hurdles

THINGS TO KNOW

HURDLE PLACEMENT HEIGHT & COMPARISON						
Women Outdoor	**DISTANCE**	**NUMBER**	**HEIGHT**	**TO 1ST**	**BETWEEN**	**LAST TO FIN**
High School	100	10	33"	13m	8.5m	10.5m
NCAA, USATF, IAAF	100	10	33"	13m	8.5m	10.5m
High School	300	8	30"	45m	35m	10m
NCAA, USATF, IAAF	400	10	30"	45m	35m	40m
Women Indoor						
High School	55/60	5	33"	13m	8.5m	8/13m
NCAA, USATF, IAAF	55/60	5	33"	13m	8.5m	8/13m
USATF	55/60	5	33"	13m	8.5m	8/13m
IAAF	55/60	5	33"	13m	8.5m	8/13m
Youth Girls Outdoor						
Midget	80	8	30"	12m	7.5m	15.5m
Youth	100	10	30"	13m	8.0m	15m
Inter-Young Women	100	10	33"	13m	8.5	15m
Youth	200	5	33"	35m	35m	10m
Inter-Young Women	400	10	30"	45m	35m	40m
Youth Girls Indoor						
Midget	55	5	30"	12m	7.5m	13m
Youth	55	5	30"	13m	8.0m	10m
Inter-Young Women	55/60	5	33"	13m	8.5m	8/13m

Special Prep (2.0 Units)

M – HUR 2 x (4h,6h,8h) /2 x4 x50m grass/12 x multi jump / +
TU – SPR 4-6xVmax drill/ 3 x2 x 150 segment run 50-50-50 cut down (5')
W - Strength, 12 x multi jumps, 12 x multi throws / +
TH - HUR acceleration: 2 x 5 x 1-2h contrast 30",33" /4 x 6h 30",33" / 12 x multi throws
F – SPR 4-6xVmax drill/ 5 x150m(+50) (5') /
SA - Strength Circuit / Multi Throws

Competitive (3.0 units)

M - 4xAccel /6x 6h Speed Hurdling (-.25) (3" lower ht)/2 x80m flat/ 12 x multi jump
TU - SPR 4-6xVmax drill/ 3 x150,120 (5') /12 x multi throws
W - Strength, 12 x multi jumps, 12 x multi throws / +
TH - HUR acceleration: 8-10 x 1-2h contrast 30",33" 4 x 5-6h 30",33"/ 8-12 multi jumps
F – SPR 4-6xVmax drill/ 4 x180m segment run 60-60-60 (5') / +
SA - compete

Competitive (3.5 units)

M - 4xAccel /4x 6h isolation LL,TL. (8.0/30”), 3x 6h Speed Hurdling/6x Speed Bounds
TU - SPR 4-6xVmax drill/ 3 x150,120 (5’) /12 x multi throws
W - Strength, 12 x multi jumps, 12 x multi throws / +
TH - HUR acceleration: 8-10 x 1-2h contrast 30”,33” 4 x 5-6h 30”,33”/ 8-12 multi jumps
F – SPR 4-6xVmax drill/ 4x 30 (3’) /HUR acceleration: 2 x 4 x 1-2h contrast 30”,33”
SA - compete