

## Guide to Offseason Training

### Guidelines

The purpose of this guide is to provide some basic information about rowing physiology and training that will assist you in staying fit over the summer and fall. Please get in touch with me if you have any rowing related questions or simply want to let me know how much faster you've gotten after making your way through this list of workouts.

**Before you read this, write down a goal that you want to achieve by the end of the summer. It doesn't need to be overly ambitious (like dropping your 2k by 20 seconds), but it should be quantifiable, attainable, and address an area of weakness. Get Stronger, hold a 1:55 for an hour, run a 10k, do a triathlon.. you get the idea.**

**REMEMBER: the #1 rule of offseason training is: STAY ACTIVE. It is amazing how quickly your fitness and motivation will deteriorate with just a week or two of inactivity. A training program that is flexible and sustainable will ALWAYS outperform one that is so hardcore it burns you out after a week.**

### Ready to Start?

There is nothing more satisfying than watching yourself gain fitness. Set a goal for the end of the summer and work every day to achieve it. Now get off the couch and do work. First, a few words of wisdom:

### Words of Wisdom

- **Scientific Precision**  
So many rowers, especially at the high school level make the fatal mistake of only really caring about their 2k score. The surest way to improve your fitness is to approach everything like it's a 2k. Every workout is a chance to demonstrate your fitness, NEVER neglect an opportunity to PR. Whether its steady state, running or lifting, record your workouts and go faster with each time- even if by only 0.1s. Make a habit of PRing on every workout, and the 2k will take care of itself.
- **Anything is better than nothing at all**  
You lose fitness at about 3x the rate you gain it. There are always going to be those days when you would rather play Fortnite or watch the Marvel movie marathon, but try to do \*something\* physical. Even a quick 20 minute jog, or simple body circuit during commercial breaks will help you maintain the fitness you have worked so hard to build.
- **Injury Prevention**  
Injuries like tendonitis, back or knee injuries can severely hurt you later on. Make sure to warm up appropriately, stretch out after workouts, and listen to your body. After a week of intense erg workouts, sometimes picking an hour swim instead of a hard 10k can still give you aerobic work without placing stress on your muscles. Don't dismiss persistent pains - see a doctor.
- **Go to the Well**  
Every once in a while look for an opportunity to really stretch your mental capacity. Say you are stuck in a rut of going 1:55s for your 3x10min workout. Next time, try breaking 1:50. Your body can sometimes forget what it's like inside the pain cave, and you will need to remind it. While you shouldn't make a habit of flying and dying on workouts, you may be surprised at what your body does when you jump off the cliff.
- **Ergs Do Float**  
Anyone who tells you that ergs don't float invariably has a bad 2k. Erg scores are important because to row properly requires power and endurance, and the more force you apply to the oar, the faster the boat will move. Do not fall into the trap of being the guy with a 7:20 that "rows really pretty." Be the guy that rows really well and pulls a 6:40.

## Rowing Physiology

Energy Systems	<p>Before developing a training program, you must be familiar with how the body satisfies the energy demands during a rowing race. A brief refresher in Biology: the body's main source of energy is ATP, which is supplied by 3 primary energy systems.</p> <ul style="list-style-type: none"> <li>• ATP-PC - used only for very short durations, 100m sprint, first 5 strokes.</li> <li>• Anaerobic - supplies energy in the absence of oxygen. Allows for high intensity activity for up to 2 minutes before the buildup of lactic acid becomes debilitating.</li> <li>• Aerobic - supplies energy to the body without the by-product of lactic acid. Any activity longer than 2-3 minutes will be predominantly aerobic.</li> </ul>				
Energy Demands During Rowing	<p>The first 5 strokes of the race utilize the ATP-PC system, during the next 20-30 strokes the body switches to anaerobic metabolism allowing you to sustain an intensity above race pace. The pace of the first minute is unsustainable as lactate produced by the anaerobic system begins to accumulate in the muscles. For the base portion of a race, the main source of energy is derived aerobically. While the aerobic system is very efficient, it is slower to supply the muscles with energy and therefore cannot support as high an intensity. Often during the final, sprint phase of a race, you will again transition back to anaerobic metabolism. Roughly 70-80% of the energy demand is satisfied aerobically with the remaining 20-30% coming from the anaerobic system.</p>				
Training the Energy Systems	<p>The majority of your training should be spent developing your aerobic system as this is the easiest to improve and contributes so significantly to the energy demands of a race. Rowing workouts can broadly be classified into 4 categories, each with different intensities and durations that train your energy systems: UT2 &amp; UT1 Steady State, Anaerobic Threshold, and Oxygen Transportation.</p>				
Steady State (UT1 & UT2)	<p>Long continuous workouts. These types of workouts will help develop your capacity to utilize oxygen. This capacity is referred to as your aerobic base. The stronger your aerobic base, the higher your potential on more challenging workouts. Divided into UT2, or low intensity, heart-rate based steady state, and UT1, higher intensity, split based steady state. UT2 workouts are best at strengthening aerobic base, while UT1 workouts increase both aerobic base and mental capacity.</p>				
Anaerobic Threshold (AT)	<p>This type of training is invaluable as it will help to develop your anaerobic and aerobic energy systems. The AT is the point at which the body can no longer sustain its intensity aerobically and switches to anaerobic metabolism. Through training you can push this threshold higher, thus allowing you to compete at a higher level prior to the onset of lactic acid production.</p>				
Oxygen Transportation (TRANS)	<p>These workouts train both the aerobic and anaerobic energy systems. All Trans workouts are done at near maximum intensity and thus introduce a significant amount of lactate into the body. Training at this intensity will allow you to better tolerate lactate and improve your ability to function aerobically at maximum output.</p>				
Developing a Periodized Training Plan	<p>Periodization is the process of varying the composition of your workout schedule during the course of the year to better maximize your potential during racing season. The closer you are to competition, a higher percentage of your work should be done a race intensity and above. Example:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Summer - 4 UT2 SS, 1 UT1 SS</td> </tr> <tr> <td style="padding: 5px;">Fall - 3 UT2 SS, 1 UT1 SS, 1 AT</td> </tr> <tr> <td style="padding: 5px;">Winter - 0 UT2 SS, 2 UT1 SS, 2 AT, 1 TRANS (planned by coaches)</td> </tr> <tr> <td style="padding: 5px;">Spring - 0 UT2 SS, 2 UT1 SS, 1 AT, 2 TRANS (planned by coaches)</td> </tr> </table>	Summer - 4 UT2 SS, 1 UT1 SS	Fall - 3 UT2 SS, 1 UT1 SS, 1 AT	Winter - 0 UT2 SS, 2 UT1 SS, 2 AT, 1 TRANS (planned by coaches)	Spring - 0 UT2 SS, 2 UT1 SS, 1 AT, 2 TRANS (planned by coaches)
Summer - 4 UT2 SS, 1 UT1 SS					
Fall - 3 UT2 SS, 1 UT1 SS, 1 AT					
Winter - 0 UT2 SS, 2 UT1 SS, 2 AT, 1 TRANS (planned by coaches)					
Spring - 0 UT2 SS, 2 UT1 SS, 1 AT, 2 TRANS (planned by coaches)					

## Steady State (UT1) [Split-based]

Guidelines	<p>Steady state refers to a type of workout that is designed to improve aerobic fitness. The aerobic system is very efficient, but requires oxygen to deliver energy to the body. Training for long durations at lower intensities will increase the capacity and efficiency of the lungs and heart to utilize oxygen. Steady state training will yield a reduction in both your resting heart rate and active heart rate at a given level of intensity. Ideally these are done on the erg, but you can also bike, swim, or run. Any kind of continuous training done at a steady heart rate is beneficial to your aerobic fitness.</p> <p>UT1 steady state is the type of steady state most rowers are more familiar with, since these workouts are the type of steady state we use during winter training. Among steady state workouts, UT2 workouts are slightly more effective at building aerobic base and fitness, while UT1 workouts are slightly more effective at building mental fortitude. Building mental capacity is essential during winter training, and we use UT1 workouts during winter training for that reason. Nevertheless, the goal of Summer and Fall workouts is not to increase mental capacity, it is to increase aerobic capacity. Therefore, rowers should primarily use UT2 workouts at home during the Summer.</p>
Pace (Split)	2k + (18-25) or 6k + (10-15)
Pace (HR)	160 - 170 (guideline)
Goals	<p>When performing any steady state workout, the intent should not be to go as fast as possible. Instead, focus on improving your power output (lower split) at a given level of intensity. UT1 steady state should be at an intensity that you feel can maintain (with effort) for long periods of time.</p>
UT1 SS Workouts	<p>If creating your own workout, don't let rest exceed 15% of the length of the intervals you use; unlike UT2 steady state, you want your heart rate to stay elevated for the duration of the workout.</p>
Example Workouts	<ul style="list-style-type: none"> <li>• Huskies - (3-6)x10min, 1:30 rest 4min@18 (2k+20), 3min@20 (2k+18), 2min@22 (2k+16), 1min@24 (2k+14), 1:30 rest</li> <li>• Long Intervals - 40 - 70 minutes total, broken into intervals, 1:30 rest (4-7)x10min @ 18-20 (2k+20) 1:30 rest (2-3)x20min @ 18-20 (2k+20) 1:30 rest (2-3)x30min @ 18-20 (2k+20) 1:30 rest</li> <li>• Speed more Speed - 10-15k continuous 10-15k @ 18-20 (2k+20), every 1000m take a 10 stroke burst at 2k pace</li> <li>• The Pyramid (one of my favorites) (2-3)x19min, 2:00 rest 4min@18 (2k+20), 3min@20 (2k+18), 2min@22 (2k+16), 1min@24 (2k+14), 2min@22 (2k+16)...</li> <li>• The Factorial - Total of 55 minutes, 1:00 rest 10min, 9min, 8min... 1min @18-22 start at (2k+20), split drops 1 every piece 1:00 rest</li> <li>• The KATN (10-15)x4min, 1:00 rest (10-15)x4min @18-22 (2k+18)</li> <li>• The Bloch (attempt at your own risk) - 5x5k, 3:00 rest 5x5000m @ 18-20 (2k+25), 3:00 rest</li> <li>• Choose Your Own Adventure - 40-90 minutes You choose the intervals, rest &lt; 15% of each interval @18-22 (2k+18-25) example: 3x15min, 2:00 rest</li> </ul>

## Steady State (UT2) [HR-based]

Guidelines	<p>Steady state refers to a type of workout that is designed to improve aerobic fitness. The aerobic system is very efficient, but requires oxygen to deliver energy to the body. Training for long durations at lower intensities will increase the capacity and efficiency of the lungs and heart to utilize oxygen. Steady state training will yield a reduction in both your resting heart rate and active heart rate at a given level of intensity. Ideally these are done on the erg, but you can also bike, swim, or run. Any kind of continuous training done at a steady heart rate is beneficial to your aerobic fitness.</p> <p>UT2 Steady State should be performed with a heart rate monitor to actively measure intensity. Many heart rate monitors will sync with PM4 and PM5 erg monitors on Concept2 ergs, and the erg screen will display your heart rate as you row. For a relatively cheap and effective option, see: <a href="https://tinyurl.com/y7no6r84">https://tinyurl.com/y7no6r84</a>. UT2 steady state should comprise the majority of your training volume over the Summer and Fall. These workouts are the most effective way to build your aerobic base.</p>
Pace (Split)	Whatever split required to get your heart rate to the desired interval, Stroke Rate 18-22
Pace (HR)	150 - 160
Goals	<p>When performing any steady state workout, the intent should not be to go as fast as possible. Instead, focus on improving your power output (lower split) at a given level of intensity. Don't fret if your UT2 splits are higher than expected at first, most rowers take time and practice to adjust to heart-rate based steady state. Your UT2 split may be as high as 2k+40 when you first start. Focus on regularly spending a substantial amount of time at the desired heart rate while maintaining proper rowing form, and splits will come. Patience and practice is key to improvement in UT2 workouts.</p>
UT2 SS Workouts	<p>UT2 Steady State is most effective when performed in intervals between 20 and 40 minutes long. For maximum effectiveness, allow substantial rest time between pieces, ideally at least 25% the length of the intervals. This rest is necessary to allow your heart rate to decrease to your resting heart rate, resetting your cardiovascular system in preparation for your next interval.</p> <p>Make sure to find some way to entertain yourself while doing UT2: watch TV or movies, listen to music or podcasts, etc. Getting bored is the easiest way to have your workout plan fail miserably.</p>
Example Workouts	<ul style="list-style-type: none"> <li>• Basic Intervals:             <ul style="list-style-type: none"> <li>(3-6)x20min, HR 150-160, at least 5:00 rest</li> <li>(2-4)x30min, HR 150-160, at least 7:30 rest</li> <li>(1-3)x40min, HR 150-160, at least 10:00 rest</li> </ul> </li> <li>• The Factorial - Total of 90 minutes             <ul style="list-style-type: none"> <li>40min, HR 150, at least 10:00 rest</li> <li>30min, HR 155, at least 7:30 rest</li> <li>20min, HR 160, at least 5:00 rest</li> </ul> </li> <li>• Choose Your Own Adventure - 40-120 minutes             <ul style="list-style-type: none"> <li>You choose the intervals, rest &gt; 25% of each interval @18-22 (HR 150-160)</li> <li>example: 3x25min, 7:00 rest</li> </ul> </li> </ul>

## Anaerobic Threshold Workouts

Guidelines	The Anaerobic Threshold (AT) is the level of intensity at which the body switches from aerobic to anaerobic metabolism. This occurs when the oxygen demand placed on the body exceeds the capacity of the aerobic system. Anaerobic metabolism allows the body to continue to perform during oxygen deprivation, but produces the debilitating by-product of lactic acid (the burning in your legs 3-4 minutes into a 2k). Improving your AT will allow you to perform at a higher intensity and for a longer duration prior to the onset of lactic acid production.
Pace (Split)	2k+(6-12), 6k+(-2-4) [splits are in relation to 6k, if you haven't done a 6k, assume 6k=2k+8]
Pace (HR)	170 - 190
Goals	The goal of each AT workout should be to achieve the fastest possible split. Through this type of training, the body will gradually adapt such that your threshold occurs at a higher percentage of your maximum capacity. While the effects of AT training will be immediately apparent in your performance on 6k tests, increasing your AT fitness is essential for improving your 2k.
AT Workouts	<p>Ideally these are done on the erg, but you can also bike, swim, or run. Standard AT workouts are done in sets of 2-4 intervals with nearly a 1:1 work:rest ratio, though any workout done around 6k pace for a duration exceeding 30 minutes will help to develop your AT fitness. Stroke rates should be 26-30. These splits are</p> <p>*guidelines* and all workouts should be done for score. Focus on improvement and try to PR each time you do a workout.</p>
Example Workouts	<ul style="list-style-type: none"> <li>• 3x10min, 1x7min, 10:00 rest 3x10min @ 26-30 (6k+/- 1) 10:00 rest, 7min @ 30 (fastest pace you can go)</li> <li>• AT Intervals - Should total 10-15k 4x3k @ 28 (6k+2) 10:00 rest 3x4k @ 28 (6k+1) 8:00 rest 5x2k @ 28 (6k-2) 7:00 rest 5k,4k,3k,2k,1k @ 26-30 (6k+5,4,3,2,1) 6:00 rest</li> <li>• Long AT Interval - Should total &gt;15k 3x6k @ 26-28 (6k+4) 10:00 rest 3x5k @ 26-28 (6K+3) 10:00 rest</li> <li>• The Pain Cave - 2x(10x1:40 on 0:20 off) 2x(10x1:40 @ 28-30 (6k-1) 0:20 rest) should total 2x20min, record average total split</li> <li>• The Factorial AT Edition- Total of 55 minutes, 1:00 rest 10min, 9min, 8min... 1min @26-30 start at (6k+7), split drops 1 every piece 1:00 rest</li> <li>• 10k for score - great workout to do on your own Requires a great deal of focus to keep the intensity level high for 40 minutes of continuous rowing. As much a mental challenge as a physical test. 10k @ 26-30, start at (6k+5) but go for score. Generally 10k is (6k+3-4)</li> <li>• The Monster - only the strong survive 2x6k 10:00 rest 6000m, the first 1000m @ 18-20 (6k+20), you don't want to any faster than 6k+20... For the remaining 5k, your current split must be 10 lower than the average. Example: first 1000m at 2:10, with 5000m to go, drop the split to a 2:00 and keep dropping it such that you are 10 seconds below the average. Done properly, your average will be -18 from where you started.</li> </ul>

## Oxygen Transportation Workouts

Guidelines	Oxygen Transportation workouts (Trans) are done at a near-maximal intensity. The purpose of this type of training is to increase the efficiency with which oxygen is transported throughout the body. Trans workouts have the added benefit of improving the body's tolerance to high levels of lactic acid.
Pace (Split)	2k+(0-4)
Pace (HR)	190 - Max HR
Goals	The goal of each Trans workout should be to achieve the fastest possible split. Because the intensity is above AT, each interval will introduce a large amount of lactate into the muscles. The body will gradually adapt enabling it to more efficiently purge lactic acid during the rest periods, and buffer its effects during the work periods. Equally important to the physiological adaptations that occur is the toughness required to produce a high quality effort for these workouts.
Trans Workouts	Ideally these are done on the erg, but you can also bike, swim, or run. Standard Trans workouts are short in duration with significant work:rest ratio. Most are performed near 2k pace. Only a small amount of your offseason training should be devoted to Trans workouts. While they comprise a much larger percentage of the training volume during the later spring, most summer and fall training should be devoted to developing longer distance fitness.
Example Workouts	<ul style="list-style-type: none"> <li>• 5x1500m - 10:00 rest 1500 @ 22, 1500 @ 26, 1500 @ open, 1500 @ 24, 1500 @ (24,28,open (500m each)) Workout is all out for score with the emphasis on the 3rd, open piece. Try to row the 3rd piece without regard to pieces 4 and 5. Try to match or exceed your 2k PR split.</li> <li>• 5x1000m - 8:00 rest All pieces are @open rate Record the average split for all. (2k+1-3).</li> <li>• The Minuter - 2x(10x1:00 on / 1:00 off) Can be done in 2 varieties: either @open rate (2k-1-2) @18,20,22...36 (2k+5, split goes down 1 every piece)</li> <li>• (6-8)x500m 3:00 rest Maximum Rate, every piece is maximum intensity, should average (2k-3-4)</li> <li>• The Temple of Doom - 500m, 750m, 1k, 1500m, 1k, 750m, 500m 6000m total, try to hold your 2k split or below for this entire workout, the emphasis is on the 1500m piece. Rest time = work time, so 2:00, 3:00, 4:00... etc.</li> <li>• 'Till the Cows Come Home - whispered through the generations of erg lore..  Get on the erg and start rowing at your 2k goal split. When you can't go any further, take 3 minutes of rest and repeat. Keep going until the cows come home. Ideally you should be going somewhere close to 2000m on your first piece, from there try to go for maximum distance on each subsequent piece.</li> </ul>

## Weight Lifting, Cross Training and Stretching

Guidelines	<p>While the majority of your training should be sport specific, cross training can serve as a valuable supplement, especially addressing an area of weak fitness. If you struggle with power on the erg, weight lifting could be great for improving your rowing ability. If you have a good deal of raw power, but struggle on steady state pieces, than long distance running, cycling, swimming, hiking or any other continuous exercise will all benefit your aerobic fitness. Especially during the offseason, you can afford to have a good percentage of your training be non-rowing. Remember to stay in touch with your old friend the erg, he will be sure to remind you how effective your cross training is.</p>
Pace (Split)	n/a
Pace (HR)	150 - max (any cross training should be done at a continuous HR, NOT ball sports)
Goals	<p>In whatever type of Cross training you perform, make it a goal to be faster and more efficient each time you exercise. If running or cycling, create a course for yourself and try to improve your time. Try to approach every workout with the same focus that you would an erg piece. Having a HR monitor is an invaluable tool for non-erging exercise as there will be no split to help steer your intensity level.</p>
Cross Training Workouts	<p>Any type of erg workout can easily be transitioned into a cross training workout. Instead of 5x5min, do 4 x 1 mile as fast as you can. You may find performing longer steady state cross training workouts better for fitness. In any case, measure your progress and try to improve in every outing.</p>
Example Workouts	<ul style="list-style-type: none"> <li>• <b>Running</b> Running will greatly benefit your overall fitness as it requires you to move your entire body weight, unlike rowing or cycling. If you have a HR monitor, use it to help gauge your intensity. As with any erg workout, it's crucial that you maintain a consistent pace for the entire duration of your workout. Nothing inhibits your growth more than taking breaks or walking in the middle of your workout.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Cycling</b> If you have a racing bike, nothing beats a 2 hour bike ride. My favorite types of rides are long and low intensity, keeping the HR nice and low and building leg power. Because biking is so dynamic relative to erging, you can sustain a given HR for much longer. One of the fastest, most efficient ways to improve your aerobic base. Plan out your routes beforehand, so that you know you won't have to stop repeatedly. There are many bike trails in the area - pick one, and bike there. You can even use the Fairfax County Parkway bike trail to pay a visit to Sandy Run!</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Swimming</b> If you know how to swim, it can be a great break from the impact of running or other cross training workouts. Swimming will also help elongate the muscles and improve your flexibility, decreasing the chances of rowing related injuries. Becoming proficient in breast stroke will help your hip flexibility.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Other, Hiking, Ball Sports..</b> These are fun and a good break, but don't count them as a workout. Endurance sports such a rowing require you to sustain a given HR for an extended period of time. Large fluctuations in HR won't improve your aerobic threshold much.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Weight Training</b> Machines are not worth the time, if you want to start weightlifting learn Olympic Lifts. Squats / Deadlifts / Power Cleans, are by far the best lifts to do for rowing. Learn the proper technique using low weight and high reps. The best lifts are those that simulate the rowing motion: legs, back, shoulders, and core. Try to use weightlifting regimes that maximize growth of fast twitch fibers. For example, try the <a href="#">strongman 5x5 program</a>, with 5x5 squat, deadlifts and bench. With lifting, it's extremely important to give yourself adequate rest - training the same muscle groups more than 3-4 times a week may make you feel the burn, but you're not improving your performance.</li> </ul>	

	<ul style="list-style-type: none"> <li>• <b>Body Circuits</b> Do these in addition to any workout and it will help stabilize your core and prevent injury. John Feng ('17) developed an excellent 9 minute plank circuit. Do each of these with no rest in between: plank 90', side plank 30' each, plank 60', plank to push up 60', knee to elbow 60', swing 60', leg opposite arm extended 60', plank 90'. Alternatively, you could do any of these exercises in stations, 60' on, 10' off: Crunches, side crunches, flutter/scissor kicks, leg lifts, 6 inches, russian twists, scullers, V ups, mountain climbers, toe touches, bicycles.</li> </ul>
Stretching	<p>Many athletes dismiss stretching because they don't appreciate the benefits it may have. Effective stretching is essential for injury prevention, but it's also an easy way to gain more reach and smoothen out your stroke. It takes time to see results, however. Unlike weightlifting where beginners often see rapid gains as their brain learns how to perform the movement, there are no such "newbie gains" with stretching. To loosen ligaments and flexors, the formula is simple – consistent, daily stretching. You will overestimate improvement over weeks and underestimate it over months.</p> <p>There are two primary forms of stretching – static and dynamic. Static stretching is far more effective but requires that you warm up beforehand. Paddling a 1k on the erg or going for a short 5' jog are great ways to warm up your muscles. As rowers, stretching routines should target hamstrings, hip flexors, core, shoulders, and quads.</p> <p>Here is an excellent 20' follow-along flexibility routine: <a href="https://youtu.be/IPKRiU9u_Hc">https://youtu.be/IPKRiU9u_Hc</a></p>