

Beginning (Sweep) Rowing Reader

By

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For use in

KIN 11A Beginning Rowing
San José State University
Department of Kinesiology

Prerequisites to take class (tested second class meeting in SPX 79 pool):

- * swim 100 yards unaided (any “style”) without stopping/touching ends of pool
- * tread water unaided for 5 minutes
- * successfully put on lifejacket/PFD while in water, treading water, unaided

STUDENTS MUST DEMONSTRATE THESE SKILLS BEFORE GOING TO THE ROWING LOCATION

and lift 30 lbs overhead unaided (tested third class meeting at rowing location)

If you have any rowing-related questions, please feel free to ask. I don't think there are any “dumb” questions! If you have any suggestions for how to improve this reader, please let me know—future students will appreciate it, as will I.

Note: this class starts at 9 AM and ends at 10:30 AM. Because we need to take oars/launches down before class, and bring them up after we get off the water, you should not take this class if you cannot get there a few minutes early. You will be driving away by 10:30.

Beginning (Sweep) Rowing Reader--Introduction

Read relevant sections both BEFORE and after class!!

Location: After the first two meetings, this class will be held at Los Gatos Rowing Club, on Lexington Reservoir, about 20 minutes from SJSU. You should not take this class if you will get there later than the published start time for class as prompt arrival is essential to your success. The address is 10000 Alma Bridge Road and directions are as follows:

Directions: Take 280 North and exit to 17 (to Santa Cruz) and pass all Los Gatos exits. You will see the reservoir on your left. Exit at Bear Creek, cross the freeway, and head back along the freeway as if back toward SJSU. Take the first exit at Alma Bridge Road and follow road around lake for approx 1.5 miles. The boathouse, shared with Santa Clara University, is on the right. Park either in a stall, or on the right heading back up the hill with wheels set to the curb; if you must park on Alma Bridge Road, note that *the entire vehicle* must be inside (not on) the white line to avoid a ticket, and avoid fire lanes.

Payment: checks should be made payable to Los Gatos Rowing Club (LGRC) and must be received with sufficient funds before the last day to add, or you will be instructor dropped. Your check entitles you to provisional membership of LGRC for the semester of the class. You may take out only the boats authorized for class use by the instructor, and only during designated class time.

First class meeting is in SPX 82. Second is a swim test in SPX 79. Thereafter, all classes are at LGRC unless notified.

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Chapter 1: What you will learn/do in this class; introduction to rowing; history of rowing; parts of boat terminology; types of shells

What you will learn/do in this class

If you attend all the classes, do all the readings (including researching the online links, which are considered part of the reader and hence part of the material upon which you may be tested), complete all the assignment--both physical and mental—you can improve your fitness (as measured by erg scores), understand the rowing stroke at a beginning level (as measured by paper/and pencil tests), be able to sweep row at a beginning level (as evaluated by the instructor), and will be competent to start training in a novice sweep crew, or be ready to take lessons in sculling. You can expect to get wet when rowing, not likely from falling in but from splash from other rowers' oars. We will spend about 4-5 weeks inside on the rowing ergometer and then head out on the water.

Introduction to rowing

Rowing can be a solo or team activity, and can be recreational or competitive. While there are many books on rowing, this short guide is written for beginners who will be sweep rowing in a class. Sweep rowing is the type of rowing where each rower has one oar, in contrast to sculling, where each rower uses two oars. Sweep rowers may row in a boat called a pair (two rowers), a four (with or without a coxswain or cox, or steering person), or an eight (eight rowers, always with a cox) and instruction usually starts in an eight, as will be the case in this class. Sculling boats are singles, doubles, and quads. Rowing can be quietly contemplative but rowers can be (and most are!) fiercely competitive. Races may be sprints (1000 or 2000 meters in spring and summer) or Head of the River ("Head") races of around 5000 meters in the fall. Although people may learn to row at almost any age, competitions start at high school level and continue through university and Olympic level into masters' (veterans') age group rowing, with competitions all over the world. Team boats may be comprised of all women, all men, or be mixed in masters' rowing, although the coxswain (steering person) usually may be of either gender. Welcome to the world of rowing. Warning: rowing may take over your life!

History of rowing

An early reference to rowing was in c. 200 BCE when those in the Greek triremes (boats with three horizontal rows of oars) were required to row boats into battle whenever the wind was not from a favorable direction for sailing. The first known use of the word "regata" [sic] was in Venice, Italy in 1274, and by 1315 boat races were included in various on-the-water festivals.

In England in 1454 the Lord Mayor's Water Procession was first held and some three centuries later these were accompanied by music, including some composed by Handel. In the early 1700s, traffic on the Thames River included a great number of oar-powered ferries, mostly transporting people across the river for a fee as a form of water taxi.

Inevitably, when there is more than one boat on the same stretch of water, then as now, a race ensues. Ferryman competed to be the fastest (and thus gain more trade) and the oldest organized, extant rowing race was first held in 1716 on the Thames. This is called Doggett's Coat and Badge, named for the Irish actor benefactor. See: http://en.wikipedia.org/wiki/Doggett%27s_Coat_and_Badge The distance was and is 4 7/8 miles and the race is still held annually in August among watermen in London.

Women were certainly rowing by at least 1814, if not before, as there is a record of a race in Chester, England, for a prize of 2 Guineas. In this sense, women's rowing mirrored men's: all rowing was for prize money among professionals. But in 1815, the first recorded Head Race was held in Oxford, UK, among (amateur) students of the various Oxford colleges. This was because the Isis River was and is too narrow to permit side-by-side racing. (See <http://www.youtube.com/watch?v=X6tBFUXMH-w> for clips of modern-day head races, at Cambridge University. Some of the rowing is pretty awful but then they, like you, are beginners!) The boats at that time were long but heavy, made of overlapping planks of wood (lapstrake, or clinker construction), and with a rudder and tiller. Most often, 6 oarsmen made up the crew. An innovation in 1828 in Newcastle was the outrigger, allowing for greater leverage by placing the oarlock outside the boat's hull.

The first university boat race was between Oxford and Cambridge in 1829. This was the first intercollegiate sport of any kind held anywhere in the world. Eight-oared boats were used and the race took place at Henley-on-Thames before 20,000 people. The famous regatta now held there, Henley Royal Regatta, began in 1839. The first book containing rowing instruction was published in 1836, "Walker's Manly Exercises." The first detailed book of rowing coaching was published in 1842, "A Treatise on the Art of Rowing as Practiced at Cambridge." Rowing soon spread to US colleges and in 1852 on Lake Winnepesaukee, NH, Harvard and Yale competed in the first US intercollegiate sporting event, predating even college football.

While college rowing spread fast in both the UK and US, it was professional rowing, outside the halls of academe, that really captured the interest of many. Professional watermen (ferryman) competed for money prizes and the competition was cut-throat, sometimes involving drilling holes in opponent's boats and attacking them with saws! The invention of the sliding seat in the mid 1800s improved times in races. Before then, some oarsmen had greased their shorts for better sliding on a fixed surface. Philadelphia arose as a center of US rowing, giving rise to the "Schuylkill Navy" amalgamation of clubs along that river. Not surprisingly, Philadelphia artist Thomas Eakins was drawn to rowing as a subject of several of his paintings. (See: <http://xroads.virginia.edu/~hyper/incorp/eakins/rowing.html> for info on rowing in art.) In time, a conflict between amateur and professional oarsmen developed, in which the professional, working-class oarsmen were excluded from the upper-class amateur events. This is the time and place that the word "amateur" (meaning someone who engages in the sport "for the love of it" rather than as means to a living, the "professional") was developed. Prizes for amateurs were silver trophies, to be engraved and returned for next year's competition. Professional oarsmen were one of the groups (along with professional baseball players) featured on an early set of US cigarette cards in the 1880s. Around the

same time, the final major equipment invention, the swiveling oarlock, was developed. Since then, equipment innovations have been largely cosmetic: better shell construction and design, and changes in oar blade shape and oar construction.

The first mention of women rowers in the US was in 1875 at Wellesley College, MA and the sport was also practiced in the 1890s by ZLAC rowing club in San Diego. Both clubs/groups are still rowing! In 1896, rowing for men was included as an original sport of the modern Olympic Games...but the events were cancelled due to adverse weather. FISA (Fédération Internationale des Sociétés d’Aviron), the sport’s governing body, had been established in 1892. Other new additions to rowing’s events were the birth of lightweight rowing in 1916, Oxford and Cambridge women’s boat races beginning in 1927 and the invention of the rowing ergometer in the 1960s. The Head of the Charles Regatta (the major US Head Race) dates from 1965, the first FISA junior regatta from 1966 (the same year that the Atlantic was first rowed across) and composite shells date from the 1970s. San Diego Crew Classic (a major 2000m race for high school, college, and masters rowers) began in 1974, women’s Olympic rowing in 1976. For more details of world, Olympic, UK and US rowing history, see: <http://www.rowinghistory.net/> and <http://www.rrm.co.uk/>

Parts of boat terminology

As previously mentioned, rowing may be broadly divided into sweep rowing and sculling. The focus of this book will be sweep rowing in an eight-oared shell and a diagram of one is shown on p. 8, with the major parts of the boat and seat numbers. You should learn these and be thoroughly proficient in the parts listed below before your first row as you may be expected to react quickly as directed by your instructor or coxswain (or cox). For a more complete glossary, see http://en.wikipedia.org/wiki/Glossary_of_rowing_terms

To understand a little of a shell, take a look at how one is made: <http://www.youtube.com/watch?v=pYPFJ17N21Q> Take note especially at the end about shoes and riggers. Parts of the boat you should know are:

Bow: the front of the boat (should have a protective bow ball)

Stern: the back of the boat

Aft: farther back, or closer to the stern *

Forward: farther forward, or closer to the bow (pronounced “forrad”) *

Port: the left side when looking toward the bow (as a rower, you will be facing backwards, or toward the stern, so the port side will seem to be on your right)

Starboard: the right side when looking toward the bow (as a rower, you will be facing backwards, or toward the stern, so the starboard side will seem to be on your left)

* avoids “in front”/“behind”; when you’re sitting backwards, this can be confusing

Ahead: in front of the bow

Astern: behind the stern

Bow seat: rower closest to the front/bow (in #1 seat)

Stroke seat: rower closest to the stern (in #8 seat)

Cox or coxswain: the person steering; in an eight, the cox sits at the stern (pronounced “coxun”)

Gunwale: the side of the shell (pronounced “gunnel”)

Shell: rowing boats are called shells; they are fragile—treat them with great care!

Rigger: (short for outrigger) the projection sideways from the shell to which the oar is attached

Gate: the fastening bar that holds the oar into the rigger; part of the oarlock

Oarlock: the 4 sides that surround the oar on the rigger

Pin: the vertical bar against which the oar works

Footstretcher: the plate to which the rower’s shoes are attached (shoes are supplied and remain in the boat)

Collar/button: the ridge on the oar that holds it from being pushed out farther in the gate

Loom: the shaft of the oar

Blade: the spoon of the oar that is in the water during the stroke

Inboard: closer to the center of the boat

Outboard: closer to the outside of the boat

CLAM: a C-shaped piece of plastic that fits on the oar near the oarlock to make the gearing easier (stands for Clip-on Load Adjusting Mechanism); put on with open part up

Rudder: the small movable fin by which the boat is steered via the steering lines

Skeg: underwater fin in, usually combined with the moving rudder

Types of shell

Shells used to be made of wood and a few still are. These are usually handmade and beautiful, almost works of art. Most rowing programs today use fiberglass or carbon fiber shells as they are usually light and stiff and can maintain those qualities for several years. Rowing shells are relatively delicate and very great care should be taken around shells at all times, both on and off the water. NEVER step into the bottom of a shell—

you may go right through and receive a large bill. Always step onto the raised deck surface, aft of your seat. NEVER step over a shell; it's so easy to lose your balance and fall onto it and crush it. And NEVER move a shell unless directed to do so by your instructor or your coxswain. An eight is about 60' long and it's all too easy to swing the bow or the stern right into an obstruction, demolishing the shell. Eights can cost \$50,000!! They weigh approximately 240 lbs (divided by 8 = 30 lbs, that you must lift).

We have already seen the parts of an eight (note: it, or more accurately "she," is always an "eight" or a "shell," never an "eight boat") but here are the other configurations of sweep and sculling shells.

Boat classes	Names	Configurations
Eight oar with coxswain	Eight (8+)	
Octuple scull with coxswain	Octuple (8x+)	
Quadruple scull without coxswain	Quad (4x)	
Quadruple scull with coxswain	Coxed Quad (4x+)	
Four oar without coxswain	Coxless Four (4-)	
Four oar with coxswain	Coxed Four (4+)	
Double scull	Double (2x)	
Pair oar without coxswain	Pair (2-)	
Pair oar with coxswain	Coxed Pair (2+)	
Single scull	Single or Skiff (1x)	

Take a look at: http://en.wikipedia.org/wiki/Rowing_%28sport%29 and see if you can identify the following sweep boats: four (with and without coxswain, and may be bow or stern coxed), pair, and eight; and the following sculling boats: single, double, and quad. [Hint: the answers are written in the top left of each picture!] Sweep boats with a cox are labelled as + and sweep boats without a cox are labeled as - . Sculling boats all use a x. Thus, a 4- is a coxless four, a 4+ is a coxed four, and a 4x is a quad etc.

Please read the entire Wikipedia entry as it gives a good overview of many aspects of the sport of rowing. Also watch the "bumps" movie.

Now that you know something about the equipment used in rowing, how do you row?
 First, you need to have a good mental picture of the technique and that is best learned on land on a rowing ergometer, or perhaps on a barge.

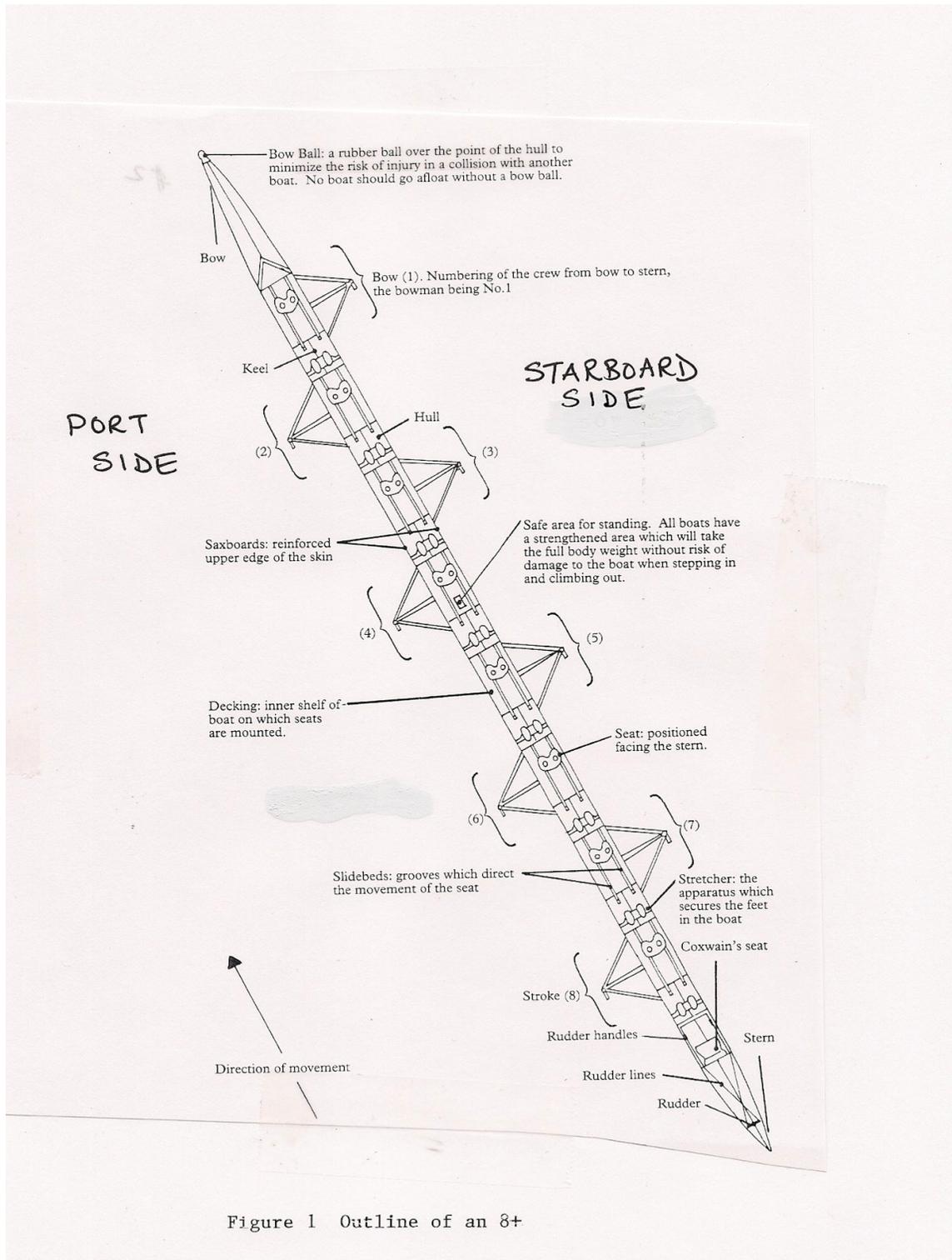


Figure 1 Outline of an 8+

Chapter 2: Preparing to row sweep by using the rowing ergometer; parts of stroke terminology; erg drills; using the erg display

Preparing to row sweep by using the rowing ergometer

While good, fast rowing is about fitness, it is also fundamentally about technique. The technique of sweep rowing is best learned on land on a rowing ergometer, or perhaps on a barge. A barge is generally two eights lashed together to make a stable platform on which 16 people may practice their technique; a rowing ergometer (usually simply, an “erg” or “ergo”) is the rowing machine seen at most gyms. We will be using the ergs for the first few weeks of this class, to get a good grasp of technique, before we go on the water.

Forget everything you have seen of people at the gym using an erg! Because they never row in a boat, using a real oar, they never think what the erg handle represents and why their “technique” would be a disaster in a real boat. From the start, when you sit on an erg and grasp the handle, imagine that the handle really is the handle of an oar. Sweep oars are 12’ long, so that a 1” alteration in oar handle height would mean a change in blade height of about 3”. That’s an enormous change and easily enough to throw off the balance of the entire boat! So, the first thing to grasp, in both senses, is the handle and its effects. This would be a good time to watch, several times:

<http://www.concept2.com/us/training/technique.asp> and go back to watching it after you try it yourself.

Second, forget everything you’ve seen in terms of sequence of drive of the legs, back, and arms by these gym rats and—most importantly—the order of how the limbs are recovered. The most important aspect to remember early on, on the erg (and on the water), is to keep the legs down as long as possible on the recovery. Raising the knees too early, as many uncoached people do on an erg, causes the hands/handle to rise to clear the knees and—as you now know—this upsets the entire boat’s balance. Before you get on an erg, think “handle = oar” and “the erg is my friend” as it never lies!!

The erg has a monitor. Forget it; fold it away, so you are not distracted by anything. You may think rowing is such a simple, repetitive action and it is, but almost everyone does it inefficiently to begin with, so it’s better to start the correct way from the first stroke.

Parts of stroke terminology

Catch: the moment the blade goes in the water and power begins to be applied

Drive: the power phase of the stroke

Release (sometimes called **Finish**): the end of the power phase when the blade is extracted

Recovery: the time between strokes when the body is repositioned

Ratio: the time relationship of the drive to the recovery; should be 1:2 to 1:4, never 1:1

Stroke rate: the number of strokes per minute

Erg drills

Most of the drills on the erg are also drills on the water (there's not much point to an erg drill if it doesn't train you for actual rowing; although there are indoor rowing/erg competitions which are sometimes won by non-rowers, competitive ergers may not be good rowers; we want you to be good rowers).

Drill #1 Arms only. The teaching point about this drill is to drill into your brain the correct handle height at the catch, in the draw through, and in the recovery. Sitting on the erg in a relaxed manner, with a slight back lean, draw the handle to your body equally with both hands (about 2 fist widths apart), to a height of about sternum level. With no pause, strike down 2" with the handle, then let the handle go away from you, gently rising the 2" up to the moment of the catch or pull. The pull in should be level all the way through at all times. If you are told you are "rowing over a barrel" it means you are pulling up then down and dumping into your lap; correct it by pulling in level, even if the power is less. When this is good individually, work to synchronize as a group.

Drill #2 Arms and body. The teaching point about this drill is to maintain the correct handle height while also pivoting forward/backward at the hips to swing. Also, do not draw in the arms until the hip pivot is almost completed, i.e. keep the arms straight as you feel the pull. Maintain all the points of drill #1, too. When this is good individually, synchronize as a group. Begin to think about ratio!

Drill #3 Half slide. The teaching point about this drill is to drive the legs down first, then open the hips and only then draw in with the hands. More difficult is the crucial part of the recovery: to let the hands go forward, then pivot at the hips *while keeping the knees down*, and only letting the knees come up when the hands/handle (think oar handle here) have passed the knees. This is much more difficult than it sounds. If you have access to a mirror, use the erg in front of a mirror and check out your own form. When this is good individually, synchronize as a group. Even though you are all different sizes and shapes, each section of the stroke should be performed exactly together; same height, same speed, and with exaggerated ratio. Now, you are probably beginning to understand why the simple act of rowing is so hard to do well in a team boat!

Drill #4 Full slide. The teaching point about this drill is to do everything precisely together and not to lunge or overextend at the catch but maintain the handle height and rise slightly at the catch. Ratio is now crucial. Practice 1:3 or 1:4. The drive should always be faster; the recovery should always be slower.

Pause drills. Drill #s 5, 6, 7, 8 Pause drills can be performed by pausing at the release, at $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or at full slide/at the catch. The point about each is to maintain precise height and timing with everyone else.

Drill #9 Using the slides. Some clubs have ergometer slides in which ergs are linked together in a long line by being placed on slides. This gives ergers the first feel of what it

is like to try to row with others because you can feel when you are with the other rowers (or not!). All the above drills may be done on slides.

The instructor will give you the drill(s) for the day at the start of each class. There are many others, and they can also be done in pairs to give recovery time between work. A list of drills and their purpose is at: <http://web.mit.edu/rowingclub/www/rowDrills.html>

Using the erg display

LGRC has two models of ergs but each displays time (or count down) stroke rate, and split time. This split is displayed as the projected time needed to row 500 meters.

For a good idea of ergs, please go to:

http://www.concept2.com/us/indoorrowers/d_home.asp and check out the links to Monitors, and watch the team boat slide movie on the home page.

The erg can be set to count up or down a certain time to be rowed (eg if set for 5 minutes, you might be asked how many meters you rowed in 5 minutes), or it can be set for e.g. 1000 meters, and you might be asked how long it took you to complete that distance. The instructor will show you how to set it at the boathouse the first few times we use it. Times/distances will be written down and used as part of the determination of your grade.

One key to training with an erg is to be able to hold a split time with consistency and not to let up for even a single stroke in the piece—just like on the water! (See p. 28 for erg times/splits, etc.)

It will take several sessions on the ergs before your instructor will take you on the water but first, you need to learn some more terminology and be aware of some safety points. Also in preparation, you should go to a weight room and check that you can lift 30lbs overhead, as you will do when you lift a boat. If this is tough for you now, work at it over the next few weeks so that you can do your share of lifting and carrying the boat from the boathouse to the water and back.



First SJSU rowing team ever to compete: Head of the Lagoon, Nov 18 2012, mixed 8+; team drawn entirely from Beginning Rowing class members.

Chapter 3: On land and at dock boat handling skills; commands terminology; safety; clothing

You now have the beginning of an idea how to row an erg! Let's learn a little more terminology in preparation for going on the water. First, always think ahead and be alert around boats and the boathouse. If someone shouts "**Heads up!**" it means you are in the way and need to take evasive action. Try never to put yourself where a boat will be maneuvered unless you are doing the maneuvering. In other words: keep out of the way!

You coxswain or instructor will go over the following commands before you begin to handle a boat on land. Note: they are *commands*; there's no democracy or consensus-building here ☺ If you're commanded to do something: do it and argue (if you must) later!

Commands terminology

"Hands on": the crew about to row place their hands on the boat in readiness to take her to the water. No talking from this point on!

"Pull her out": most boats are on sliding cradles; this means to pull out the slides.

"Up and inch and out": fairly obvious meaning; not so obvious is that more than an inch up will mean likely hitting the boat above and doing possibly serious damage. Rowers should position themselves half of the crew on each side of the boat in preparation for this command

"Up to shoulders, ready up": boats are typically moved on rowers' shoulders. From the direction of travel, the first rower should go to the right side, the second to the left, ALWAYS, so everyone can anticipate their side and not catch their neck in a potentially painful move.

"Walk her forward, ready walk": move the boat in the direction of travel. Do not turn/pivot the boat until instructed to do so. At 60', a pivot at one end of an eight could cause the other end to hit something.

Once the dock is reached, you will hear the following commands:

"Toes to the edge": obvious meaning, but do go all the way to the edge to make the lowering into the water easier

"Up and overhead, ready up": all rowers lift together until arms are straight up (this is why you need to be able to lift 30 lbs overhead!)

"Roll her out and down": roll the boat out away from the dock, keep her well away from the dock and lower gently into the water

Once the boat is on the water, four people (usually the closest four) will be directed to get the oars which are always taken down before the boat, while the other four open the oarlocks and carefully close all hatches to make watertight. *Each rower is responsible*

for his/her own oar and should not let go of the oar until back on the dock and having stepped ashore, and all oars are brought in. The coxswain will then say:

“Count down when ready”: when you have all your equipment ready (rigger oarlock gate is secured, footplate in the correct place, your water bottle etc. is in the boat) and only then, shout out your seat number so the cox can hear. When all eight have called their number, the cox will say:

“Oars across”: the signal for those who can put their oars out onto the water to do so, with the blade flat to provide resistance to rolling the boat; keep holding on to your oar handle from now on!

“One foot in and down”: place one foot on the non-slip surface (NO stepping into the bottom of the boat; you may go through), then the other, then sit down with the handle over your knees and “in front” of you, meaning nearer to the cox than you, ready to take a stroke

You will then have a few moments to get ready, possibly being asked to count down again when ready, then you will be told either to “push off in two,” when you push the boat away from the dock and lean away a little to keep the riggers from scraping the dock or “walk her down” which means to push along the dock until stroke seat pushes off last

“Sit easy”: do not row; sit with blade on water

“Set up the boat”: to sit (as in providing “training wheels”) with inside hand above and outside hand below the oar, the shaft of which should be locked onto your inside thigh to provide stability. *Poor setting up is infuriating to those rowing; when you are setting up the boat you have an important part to play; don’t go to sleep and do this badly*

“Way enough”: to stop rowing immediately

“Hold water!”: to place the blades in the “braking” position (perpendicular to water) to stop forward momentum; this could be an emergency so needs to be taken very seriously

“Ports/starboards to back; starboards/ports to row”: a means of turning the boat around where one side takes arms and back rowing strokes (no legs) and other side backs the blades, or rows as if backwards, also no legs, keeping the “fin” of the blade visible to balance the boat

Commands for reaching the dock at the end of the row, getting out, and taking the boat back to the boathouse will include which individual rower or pairs will row her in, and with what intensity, e.g. **“Bow pair, arms only, ready row.”** After you get out, remove the oars, and the command **“Up and overhead”** is given, the next will be **“Split from bow”** and it is *essential* that rowers split right, then left, then right, etc. so everyone knows to which side they must move.

Safety

Perhaps the most obvious safety precaution is that all rowers should be able to swim. You will have been tested for this early in the semester but IF you should be in a boat that

swamps or capsizes, no matter what type of boat, unless it is on fire, ***stay with the boat.*** The boat will float, is large, and acts like a giant Personal Floatation Device/lifejacket; you, on the other hand, have a small head and are difficult to see. Do not ever be tempted to “swim for it.” Hang on until rescue arrives. If you need to and can, consider using an oar to attract attention. Unlike most other vessel users, rowers are not required to wear PFDs while rowing. That is because they would severely impede your rowing stroke. If you ever get into rowing a single, or row on open water, you are most strongly advised to carry an inflatable PFD for use in an emergency.

Cold shock. This is the body’s automatic reaction to sudden immersion in cold water and can cause drowning if you are unprepared for it. In the first few seconds, you will gasp and must fight to control that reflex and keep water out of your mouth/lungs. It only lasts a few seconds but fight the urge to panic or to shout. You can’t speak because you can’t generate enough lung power. As you are controlling your breathing, control your limb movements and hang on to the boat. Once you have done those two vital things, you can pause and take stock of the situation. Wave an oar, use a whistle, shout: do whatever it takes to get noticed. Watch this NOW; IT MAY SAVE YOUR LIFE:

<http://www.youtube.com/watch?v=Sf301CcloN0>

Rowing should never take place if the combined air and water temperature (in Fahrenheit) is below a total of 100 degrees and in anything close to that, supervision and caution should both be utilized.

Bow balls should be firmly in place on all boats to prevent piercing a rower in a head-on collision. If you notice a loose or missing bow ball, don’t go out until it is fixed.

Shoes: are provided in the boat for all rowers (but not cox). Check there are heel tie-downs to keep the heel equal or closer than 2” to the footplate for ease of kicking off in case of swamping and need to exit in a hurry under water. Check yours each time you row.

Traffic pattern: find out if there is a traffic pattern on the water and stick to it. Most confined places, including LGRC/Lexington, have a counterclockwise pattern. Stick to it and look out for other water users at all times.

Weather concerns: your instructor will decide if rowing can take place. Weather features to bear in mind in addition to water and air temperature are the general forecast, the wind direction and speed, wave height, presence of mist/fog, likelihood of thunder/lightning, and hours of darkness. Expect to row if there is light rain.

Clothing

Shoes are provided but you should wear tennis shoes with a good grip to carry the boat and to erg. Shorts should not be baggy or long (they may catch in the sliding seat) and bike shorts are ideal. Good socks (ever heard of “crew” socks!) that cover the calf are worthwhile. A T shirt and sweats in colder weather make up all that you need. You may wish to bring a water bottle. There is no water supply at the boathouse although there are

pit toilets. If it is hot, put on sunscreen and then wash your hands so there is no residue left on your hands, which would make holding the oar handle difficult.

Once we start rowing on the water, you may be asked to cox at any time, so always have an additional jacket, sweat pants, and maybe woolly hat and gloves, in your car, ready to put on if you are chosen to cox. The cox seat is small and not very strong so if you weigh more than 175 lbs, you may not cox and will need to learn the skills by reading and observing instead of doing. The instructor may ask you your weight for this reason.



Women's 4+ sets boat in water for Gold Rush regatta, May 19, 2012. First sprint race ever. Won silver medals!

Chapter 4: Coxing; seat terminology; positions in an 8+

Everyone under 175 pounds must be prepared to take their turn at coxing and learn the basic skills of coxing.

The cox is the coach if the instructor is too far away to be heard. The cox is in charge of the boat and has responsibility for the safe operation of the boat at all times. The cox must be listened to and his/her instructions must be carried out.

The cox will go through all the commands listed on the previous pages and expects you to know them all. On the other hand, the cox is learning too, so please do all you can to help him/her if asked. It is the most difficult position to do well.

In addition to the commands, the cox's major job is to steer. In the eights, push the rope forward on the side to which you wish to turn. If you want to turn to port, or left, push the rope forward on the left side. Think of following your hand around a turn.

The most difficult part of coxing in the early stages is docking the boat. **DO NOT ATTEMPT TO DOCK THE BOAT UNTIL THE INSTRUCTOR IS ON THE DOCK AND GIVES YOU PERMISSION TO DOCK.**

Rowers must listen closely to the commands given by the cox, especially when docking, and carry them out immediately.

The cox typically runs the drills, or distances, called "pieces," in the boat if the instructor does not have all boats together. The cox must know the seat numbers (refer to rowers by seat number, not name) and expects the rowers to know their seat number. You may also need to use the following terminology:

Seat terminology

Bow pair: seats #1 and 2

Stern pair: seats # 7 and 8

Bow four: seats # 1, 2, 3, and 4

Stern four: seats # 5, 6, 7, and 8

Middle four: seats # 3, 4, 5, and 6

Starboards: seats # 1, 3, 5, and 7

Ports: seats # 2, 4, 6, and 8

If as cox, you are in any doubt about whether another boat has seen you, assume they have not, and call out until you receive an acknowledgement.

In addition to running drills/pieces, the cox may coach a little. You may remind rowers to check their handle heights, to sit up straight, not to lean to one side or the other, not to look out of the boat, to keep a good ratio, to driver harder etc. The cox must keep order

and discipline among the crew, and be a psychologist, too, yet she/he may be the smallest person on board. As a consequence, there are many jokes about coxes' Napoleon-like qualities. In fact, each seat has supposed qualities attached to it, as the following humorous chart indicates.

Positions in an 8+

Qualities of an 8: For a somewhat tongue-in-cheek look at who rows where, see <http://www.rice.edu/~hofer/library/seatprofiles.html> Like most humor, there is some truth to this. This is a more down-to-earth look: <http://navylites.org/traits> Bow and 2 generally must have the best technique and anticipation. 3, 4, 5, and 6 are usually the “engine room” while 7 and 8 must have perfectly rhythmic timing. When crews row as mixed eights, there are many schools of thought: do you put the 4 women (generally lighter) rowers in the bow? Do you put the 4 men (generally stronger) in the middle? Whatever formation is used, most crucial is equal power on port and starboard!

Boats are most usually rigged with a port rower at stroke but they can be starboard stroked/rigged, in which case bow is port. There are also forms of “bucket” or “Italian” or “German” rigging used, where the seats do not alternate down the boat, with two together on one side, for example, although ultimately of course, having four on each side total.



Women's 4+ wins silver medal at Gold Rush regatta, 2012.

Chapter 5: Your first on the water row: technique; on the water drills; notes to cox/docking; in boat adjustments

Finally, you know enough to go on the water! Bear in mind that typically on the east coast, the entire fall and spring are spent on land before going on the water. The instructor will determine who sits where (where you are “boated”) and will attempt to give everyone a chance to row on both port and starboard sides. The goal is to have everyone be able to row both sides but almost everyone prefers one side to the other. As you develop a preference, let the instructor know and your preference will be given as far as possible. All boats will row initially as mixed gender, so as to keep them more together, but this depends upon the gender distribution in the class. If possible, there will be opportunities to row as men’s and women’s crews, later in the semester, at times. And please remember that most people will cox at least once. We will only go out in eights; if the numbers don’t work out (and more often than not, they will not) the extras will likely work on ergs. This will be rotated as much as possible but if you arrive late, you will most likely erg, as boats will have been set by then. Do not switch boats/seats without consulting the instructor. Occasionally, rowers may ride in the launch and may switch in/out on the water.

The typical list of what to do when you arrive at class, once on the water rowing starts is: on a rowing day, the first thing to do will be to take down a launch for the instructor (everyone check first there is gas, the stern plug is in, and there is a paddle on board). At least 10 people must be on the launch before it is taken down, to prevent it “escaping” on the hill. Oars must also be taken down, as directed, and left with tips down (to protect the paint) off to the side of the concrete ramp. Next comes a brief warm up on the ergs and finally, boats are taken down on the coxswains’ commands.

Boats must stay together, as far as possible, unless directed to work alone. Usually, we will have 2 mixed eights working together on drills and pieces. Stay near each other! If one boat gets ahead, go slower by rowing at a lower stroke rate, by rowing half slide, or arms only etc, or by having some rowers sit out.

Technique

Technique will be taught/coached mostly on the water, both individually and to the whole boat. For this reason, while the instructor is teaching one person, everyone should listen and apply the pointers to themselves and their own rowing. Please—try not to take “correction” personally! By this, I mean keeping the instructor’s comments about your rowing separate from them being any reflection on you as a person. Some rowers find it very hard to make this distinction and, as a result, their rowing suffers.

Sections of the stroke: First, please return to watching this video mentioned before: <http://www.concept2.com/us/training/technique.asp> Things to look for are those mentioned on the video: the power phase being applied first by the legs (with no opening of the back), then by opening up from the hips (yet still keeping the arms straight), and then by drawing the arms into the body.

In the recovery phase, first the arms go away from the body (you may hear the coach/cox shout “fast hands away” to remind you not to dawdle on this), then the hips rock over while keeping the legs down as the oar handle crosses over the knees, (and this position is the maximum that you should reach—don’t over reach at the end of the recovery), and finally the knees bend to maximum compression with the shins vertical.

All rowing will at first be “**on the square**” meaning that the blade is not feathered.

Timing: As if all this wasn’t enough, you also have to do it exactly in time with everyone else! Every section of the stroke needs to be exactly with the others. Take your timing from stroke seat if you are a port (or 7 seat!), and from 7 seat if you are a starboard. Unless directed to do so, watch only that person’s oar blade, the entire time you are rowing = FOCUS! Sometimes, you may be told to watch the person who is directly aft of you and match them for timing at all phases, and oar handle height.

Oar handle height: This is perhaps the key to having a good time rowing. If the entire crew have the correct oar handle height, the boat is set. If just one person is off, the boat is down to one side or the other and it’s not so much fun, at all. Aim to pull in to mid-sternum height, then as part of the release, drop/strike the handle down about 2” and carry the handle at that height almost all the way to the end of the recovery.

Balancing the boat: An early drill that you will do is for all ports to raise, and simultaneously for all starboards to lower, their hands (and vice versa). This will make the boat lurch to the starboard side. If the boat is down to your side while rowing, raise your hands/handle a little in the recovery phase. If the boat is up on your side (harder to be aware of, because you will be having a great time and perhaps not notice that the other side is miserable as they are unable to get their blades off the water) lower your hands/handle on the recovery to permit the other side to lower their hands! Balancing the boat is a skill you need to be alert to every time you row, for the rest of your life. Even when sitting at ease at the end of a piece, keep the boat balanced. Even when turning the boat, keep her balanced. One key is to listen to the rowing; if you hear blades on the water, think which side is high/low and how can you make it better?

Entry: One of the keys to fast rowing is a fast entry with no hesitation on placement of the oar in the water. If you are told you are hesitating, that means there is a significant pause between getting to full compression and placing the blade in the water. A good way to remove the pause is (once you start rowing on the feather) to square the blade earlier, and let the blade fall into the water by gravity.

Holding the oar: Hands should be “soft,” meaning with a good relaxed feel on the handle, very far from a death grip. They should be placed a comfortable distance apart and at the release, the outside arm should continue the line of the oar, with the outside elbow pointing out, and NOT down. This outward pointing elbow (“chicken

wing”) will also help with keeping the handle up and not dumping it into your lap at the release.

Sitting position to row: Everyone should sit up at all times and not slump. Tall rowing is generally good rowing. In addition to sitting tall, try to keep in the center line of the shell, without leaning over to port or starboard, which upsets the boat’s balance.

Arms/legs position: During the recovery phase, your inside knee should be between (“inside”) your arms. Another way to think of it is that your outside knee should be outside your arms. This is simply to allow your chest to have space between your legs at full compression.

Sitting out position: When you are not rowing, you will be “sitting out” and your function is to “**set the boat,**” which means to keep it balanced. Your outside hand should be palm up on the handle, and your inside hand should be palm down; your handle should be braced against your bent thigh. All of this keeps the blade in contact with the water and you and your pair partner thus provide the training wheels that keep the boat balanced while the stroke is being learned.

Feathering/squaring: After you have some grasp of rowing in time on the square, you will add in feathering the blade. The inside hand, and ONLY the inside hand, does the feathering movement, while the outside hand is the weight that keeps the handle at the correct height. To feather the blade, the inside wrist drops--but the arm stays at the same height-- to rotate the oar in the oarlock. During the recovery and relatively quickly, the blade is squared; certainly by the time the handle passes the knees, the blade should be fully squared. You should feel the handle rotating inside the loose grip of the outside hand. The oar collar is flat at the point when the oar is squared and when feathered, and you should feel/hear these positions.

“Way enough”: If commanded to way enough/stop the boat, stick the blade in on the square, so as to give maximum resistance to the water.

Turning the boat: Typically, one whole side backs first, and then one side rows, alternately but all together as a side. This is done with arms and back only and the boat should be kept balanced the whole time. Those who are backing should be sure to keep the fins of their blades visible, so that the handle is at the correct height to maintain balance. To back your blade, flip it over, so the concave side is facing you, and push the blade away from you.

Backing the boat: Occasionally, such as when getting into a start lane for a sprint or aligning for any race, the whole crew will back the boat, meaning all rowers flip their blades and perform the backing motion more frequently used as part of the boat-turning maneuver. Sometimes, to make this a more delicate, slower maneuver, some rowers are asked to drop out while the remainder continue backing. Those not backing should “**tip their blades**” so that they do not dive under the water. The aft part of the blade should be raised by a slight wrist drop.

On the water drills

Likely drills will include the following. You should read these through and gain some understanding so that you can put them into action on the water with a quick refresher.

Pieces: A “piece” is a subset of the day’s rowing; a set sequence of drills. If you are the cox for the day, write them down and take out with you.

Pause drills: the recovery phase of the stroke can be paused at various points, perhaps at half slide, or at body over. The point of this is to have all eight get to that point at the same time, and at the same handle height

Rowing on the square: the blades are not feathered on the recovery but kept square at all times. This helps in handle height and makes the emphasis on handle height rather than on squaring timing

Feathering drills: some rowing is done at half feather, meaning not fully feathered. This gives more time to get the oar squared and prepared, ready for entry into the water

Reduced slide drills: some rowing may be done at $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ slide. Again, this is a timing drill and to check everyone gets to the same place at the same time

Pairs in/out drills: many drills are not done by all eight, but by fours or sixes. The pair to go in/out will be told

Pick drills: often used as part of a warm up to fine tune timing. Initially, crews do this with a pair out to set the boat; better crews can do all 8. First the rowers perform arms only for e.g. 10 strokes, then go to arms and back for 10, then arms back and half slide for 10, then full stroke for 10. Then switch pairs out/in and repeat

Stroke rate drills: many drills simply work on stroke rate changes. The base rate is usually around 20 for paddling, and then may go up in 2s in a pyramid (eg 10 strokes at 20, then 10 at 22, then 10 at 24, etc. and down)

Inside/outside arm only drill: pulling with only one hand; note the inside hand is the one nearer to the blade; the outside hand is the one at the end of the handle. The point of this drill is to differentiate what each hand/arm does

Eyes closed drill: everyone (except the cox) rows with closed eyes. This helps rowers “feel” the stroke being united with everyone else’s and also concentrates the hearing sense on listening for the various parts of the stroke and to hear if oars are dragging in the water

Plop drill: rowers sit at the catch and remain there; the only movement is of the arms, dropping the blades into the water, and using the outside hand to create the pressure to get the blade out. It is a timing drill

Steady state drill: row at a set stroke rate and keep it there for a stated period of time or distance

On/off drills: crews may be told to paddle for (eg) 15 strokes, then row full power for (eg) 20 strokes, etc. for a certain number of repetitions, or for a certain distance

Cut the cake drill: at the release, get the oar out of the water as usual but then extend the arms only and take an “air stroke” instead of the normal drive. This helps train rowers to start the recovery with the arms first

Feet out drill: instead of putting feet in the shoes, rest the feet on top of the shoes and row otherwise as normal. This aids in a better release and recovery

A list of drills and their purpose is at: <http://web.mit.edu/rowingclub/www/rowDrills.html>

Notes to cox/docking

Most people will be asked to cox in rotation. If it is your turn, first be sure you will be warm enough by wearing more clothes than when you row. Your first responsibility is to keep your crew (and boat) safe from injury/damage. Take charge by giving the commands seriously. Think ahead and watch all around--both ends--of the boat, both on and off the water.

The cox box You must first get a cox box, and mic. They are kept in the cupboard below the line-up bulletin board. Unplug the charger of any box with a red light and test it in the testing unit in the cupboard. First, attach your mic then plug in the speakers; the plug is asymmetrical and only fits one way up. Turn the volume dial on and up to be heard. *Carry the cox box only by the carrying cord and NOT by anything electrical* and leave the mic attached.

In the boat, the on-board speakers must be attached to the cox box. Remember that the plug is asymmetrical to be easy to plug in. Your mic should fit on your head so that it is kept no more than 1” from your mouth—it fits over your left ear.

Set the readings to zero by using the switch. You will get a read out of the stroke rate (only when stroke seat is moving—it works via a magnet attached under stroke’s seat) and the number of strokes taken, and the time, since the last zero-ing.

Unless told to do otherwise, your main job as cox is to steer and stop the boat if you see any emergency situation developing (e.g. you are about to hit anything). The rudder is 2” square and very inefficient at steering a 60’ boat, so it takes a while to respond. Most novice coxswains oversteer as a result. Don’t move the rudder unless you have to and return it to center when done.

A safe docking is everyone’s responsibility. The cox will decide (or be told by the instructor) on which side to dock. The side the wind blows over first is usually the better side as the boat will be blown closer to, rather than farther from, the dock. COME IN SLOWLY with probably just a pair rowing, by arms only. If you take a wide turn to line up the boat, parallel to the dock, about 5 boat lengths away, coming in will be easier than

turning near the dock. **DO NOT DOCK** until the instructor is ready to catch the boat. Have rowers lean slightly away from the dock to make the riggers clear above the dock. More damage happens at the dock than anywhere else. Second most common is returning into the boathouse; don't relax until the boat is put away!

In boat adjustments

There are two main items rowers may need to adjust for their size in each seat: the position of the footplate, and the height of the oarlock.

The **footplate** should be adjusted aft/forward so that you do not hit the front or back stops on the slides (rails) under your seat. Furthermore, the ideal position is such that your hips are exactly level with the pin at maximum compression of your legs, ie when your shins are vertical. Once you find this point, memorize how many “notches” are showing in the adjustment and then you can always re-adjust any seat to this point.

The oarlock has **washers** that adjust the height up/down. The ideal height for the handle to be at when at the release is level with your sternum. After obtaining the permission of the cox, feel free to do a little experimenting with the pop-out washers during breaks on the water. Everyone will need to lean away a little from your side while you make this adjustment. Once you know your height, stick to it; it can drive other rowers crazy if someone is always changing their pop-outs!



Mixed 8+ carries boat back after race—won silver medal at Gold Rush regatta 2012.

Chapter 6: Technical stuff: tools, rigging, nutrition, flexibility, injury prevention

This chapter will be of limited relevance to you in class but if you continue rowing after this class, or if you row in a regatta, it should be helpful.

Tools and rigging Most boats in North America are rigged and de-rigged (the riggers are put on, taken off) with a 7/16" wrench. Get yourself one, if rowing seems to be in your future! There are entire books written about the height of your rigging, the spread between the oarlocks, the optimum gearing (placement of collar), best oar length etc. (eg "The Nuts & Bolts Guide to Rigging")

Nutrition is similar to many other high performance sports and again, there are entire libraries devoted to sports nutrition. Rowers can use phenomenal amounts of energy and so may need to eat more to compensate. Ideally, do not eat a large meal if you have less than 3 hours to go before a hard workout. Water is crucial to maximal performance and taking a bottle of water out with you on the boat is a good idea. A great start for more information can be found at:

http://www.nutritionassessment.com/index.php?option=com_content&view=article&id=22&Itemid=32

Flexibility and injury prevention The most likely muscle group to need stretching for rowing is the hamstrings. A good stretching guide for rowers can be found at: <http://www.row2k.com/physio/overvie1.html> Most professionals now suggest that stretching is best done after exercise when the muscles are warmed up. A good way to minimize the possibility of injury is to warm up on the erg for a few minutes prior to the start of class.

Blisters are a very common complaint in rowing. In time, you will develop calluses but some things that may help are: grasp the handle less firmly; check there is no grit/sand on the handle by sloshing a little water over the handle and then drying your hands. If you develop a blister, you may need to release the fluid with a sterile needle after class and cover it to keep it clean. If desperate, wear cycle mitts (fingerless gloves) but only as a very last resort.



Gold Rush regatta, 2012; everyone won at least one silver medal!

Chapter 7: Racing; age group/Olympic rowing; training; what's next?

Races are held throughout the year in climates such as California's. The fall season is the longer distance or head race season, and the spring is the sprint season. Head races are typically around 5000 meters, or 3 miles, and may take around 20 minutes to complete. One fact sometimes not realized by novices is that since one also has to row TO the start, the actual distance rowed is twice this distance. Head races are started as a procession with one boat starting before the next and the next, etc.; the timers keep start and finish times on all crews and the winner is usually not known until all the elapsed times of racing are compiled. Starts are "on the paddle" with power being brought up gradually so that the crew is rowing at full power as they cross the start line. Often, because rivers are narrow, the overtaking part can be quite hair-raising and clashes of oars are not uncommon. Make sure to hold onto yours firmly so that it may be the other crew who lose a grip on an oar or even "catch a crab" (get the oar stuck in the water, often meaning the boat has to stop to get the oar extracted). Overtaking another boat is a big deal and often gives that crew a huge surge of adrenalin while the overtaken boat usually fades quickly as a result. Head races can be held for any of the various sweep or sculling boats and a big regatta may have every category, for men, for women, for mixed crews, for different age groups, for lightweights, and for novices. Races with different-aged crews are handicapped by age, by adding seconds at the end of the race.



Post race celebration after the BIAC fall regatta Nov 2013, novice masters 8+, silver

Sprint races are held with, typically, 6 or 7 boats abreast at the start, which compete either over the Olympic 2000 meter distance or sometimes the shorter 1000 meter distance. Starts are on the commands “Attention!” “Row!” and start from either a stake-boat holder holding the stern, or from a in-water device that holds the boat in place, or occasionally, from the cox holding an overhead rope. Crews need to learn the skill of backing into the start, holding the boat in a straight line in any wind (may necessitate 2 seat sculling bow’s oar, or 3 seat sculling 2 seat’s oar to correct the boat’s heading). If conditions are very windy, instead of the “Attention!” “Row!” commands, there may be a countdown start. In this, the starter will say “5-4-3-2-1-Attention! Row!” so that the boat can be kept straight during the countdown and crews know roughly when the start will be. The first few strokes of the race are usually shorter. Such sprint races often have buoyed courses (going out of your lane is only a penalty if you impede another crew) and the buoys are colored to let crews know where they are on the course. Because the force on the boat at the start is considerable, there is a 100 meter “breakage” zone. If something breaks (as opposed to comes undone or a rowing error is made) in that zone, the race may be restarted once the repair is made. Sprints have from 5-10 minutes between events, sometimes called having 5 minute centers. Often, sprint races may have heats. Winning boats go on to the “Grand Final” and losing boats go on to the “Petite Final” or Repechage; the latter gives a second opportunity to make the grand final.

Age group/Olympic rowing

Rowers may start competing in high school. Often there are races for the varsity, junior varsity, even 3V or 4V crews, as well as novice and freshman crews (which may or may not be the same; a novice is in his/her first year of rowing, regardless of age). College crews have similar designations. Olympic rowing, like high school and college rowing, has races for both men’s and women’s crews, in many (but not all) of the various types of boats. Rowing is one of the few sports that has been present at every summer Olympics.

Masters’ rowing (which is also called veterans’ rowing in some places) refers to age group rowing, not to mastery of the sport! Masters’ rowers may start competing right out of college and races are divided up by average crew age (not counting the cox’s age). If there are enough boats entered, masters race only against those close to them in age; if not, races are handicapped by age and older crews are given a few seconds, usually at the start. This means that a count up begins on “Row” as the oldest boat starts first, and younger crews start on their designated number as the count up proceeds. In this system, the boat that finished first, wins. In some cases, especially if it is windy, all boats may start together and the result is worked out after the finish with the addition of the handicap.

Masters crews have all the previously-mentioned categories of rowing but also row as mixed gender crews in doubles, quads, fours and eights. These crews, likewise, are age handicapped.

In addition to the Olympic regattas, high school (juniors) regattas, and masters regattas are held, all over the world. Most countries hold regional and national events for all ages and both genders, and FISA holds an annual masters’ world regatta. Rowing truly is a sport for a lifetime! And with that in mind...

Training

Training for rowing depends on the type of race you plan to enter, if at all. You could simply go out regularly and row for fun. If you want to get better technique, you need a coach. You cannot possibly see yourself rowing and know what you do/what to correct. Most likely you will want to improve your fitness or better your time(s). If so, you will need to work with FITT (Frequency, Intensity, Type, and Time).

Frequency (how often you do the exercise) is a fine line between working on stressing the body so that it adapts, and overtraining. You may exercise the cardio-respiratory system aerobically (from 3-6 times per week) and also exercise with resistance training, ideally about 3 times per week, with exercises/weights that make your body move in as similar way to rowing as possible. If you have time and access to an erg, try adding a third session a week, out of class time.

Intensity (how hard you work) for cardio-respiratory training is most often measured by heart rate (HR). You should first determine your maximum heart rate (assuming you are healthy enough to do so). The formula most often used is $220 - \text{your age} = \text{max HR}$. About 60% of your max HR might be a good place to start but those who have been rowing for a while may find that 70-85% max HR works best. An ideal work out routine will have some steady state rowing, some on/off rowing, and some maximal (test) rowing at as close to 100% for the duration of the test as possible. Intensity for resistance training can be measured by the time needed to complete the exercise, the amount of weight lifted, or how many repetitions are performed. (See also p. 28.)

Type refers to the type of exercise you do. There are many types of cardio-respiratory training that use the large muscles in a continuous manner. A variety here, or cross training, may be advantageous. Types of resistance training, in addition to the obvious simple weight lifting, includes using bands or a circuit training routine. Biking is a good cross training for rowing.

Time is how long you do the activity. Beginners with cardio-respiratory or resistance training should take 20-30 minutes, rising to 45-60 minutes for most individuals. Improvement is generally seen over a minimum of 6 weeks.

A good rowing program should combine a regular row (steady state) day, a day working on speed, a day working on endurance, with recovery rows (or another activity such as focus on technique) in between.

And don't forget to rest! Most people need at least one day off per week. More is not necessarily better!!

What's next?

Places that you can continue rowing in the San Francisco Bay area are:

- Los Gatos Rowing Club www.lgrc.org (in Los Gatos)
- Bair Island Aquatic center www.gobair.org (in Redwood City)
- Marin Rowing Association www.marinrowing.org (in Marin)

Each of these programs has very active masters' rowing programs and would welcome you to join them! You will likely first row in the novice category, and may wish to learn to scull, in addition to your beginning knowledge of sweep rowing. Most coaches say that the better sculler you are, the better sweep rower you are, because you learn good "touch" as a sculler, especially in a single.

The national organization is US Rowing at www.usrowing.org and there are rowing clubs in most countries of the world. Other useful rowing sites are:

<http://www.Row2k.com> which lists regattas and has lots of rowing news

www.rowingnews.com which has...rowing news!

www.regattacentral.com which also has regatta information

www.concept2.com which gives information about rowing machines, oars, and general rowing news, especially indoor rowing

http://www.concept2.com/files/pdf/us/training/Training_PaceChart.pdf gives 500m split times and predicted times for 1, 2, 5, 6, and 10k. See also next page for abbreviated version.

CONCEPT2 INDOOR ROWER PACE CHART

Use this chart to predict your final time or distance for the workouts shown.

Average pace per	Your time will be:					Your distance will be:	
	500m	1000m	2000m	5000m	6000m	10,000m	30 min.
1:10	2:20	4:40	11:40	14:00	23:20	12,857	25,714
1:12	2:24	4:48	12:00	14:24	24:00	12,500	25,000
1:14	2:28	4:56	12:20	14:48	24:40	12,162	24,324
1:16	2:32	5:04	12:40	15:12	25:20	11,842	23,684
1:18	2:36	5:12	13:00	15:36	26:00	11,538	23,077
1:20	2:40	5:20	13:20	16:00	26:40	11,250	22,500
1:22	2:44	5:28	13:40	16:24	27:20	10,976	21,951
1:24	2:48	5:36	14:00	16:48	28:00	10,714	21,429
1:26	2:52	5:44	14:20	17:12	28:40	10,465	20,930
1:28	2:56	5:52	14:40	17:36	29:20	10,227	20,455
1:30	3:00	6:00	15:00	18:00	30:00	10,000	20,000
1:32	3:04	6:08	15:20	18:24	30:40	9783	19,565
1:34	3:08	6:16	15:40	18:48	31:20	9574	19,149
1:36	3:12	6:24	16:00	19:12	32:00	9375	18,750
1:38	3:16	6:32	16:20	19:36	32:40	9184	18,367
1:40	3:20	6:40	16:40	20:00	33:20	9000	18,000
1:42	3:24	6:48	17:00	20:24	34:00	8824	17,647
1:44	3:28	6:56	17:20	20:48	34:40	8654	17,308
1:46	3:32	7:04	17:40	21:12	35:20	8491	16,981
1:48	3:36	7:12	18:00	21:36	36:00	8333	16,667
1:50	3:40	7:20	18:20	22:00	36:40	8182	16,364
1:52	3:44	7:28	18:40	22:24	37:20	8036	16,071
1:54	3:48	7:36	19:00	22:48	38:00	7895	15,789
1:56	3:52	7:44	19:20	23:12	38:40	7759	15,517
1:58	3:56	7:52	19:40	23:36	39:20	7627	15,254
2:00	4:00	8:00	20:00	24:00	40:00	7500	15,000
2:02	4:04	8:08	20:20	24:24	40:40	7377	14,754
2:04	4:08	8:16	20:40	24:48	41:20	7258	14,516
2:06	4:12	8:24	21:00	25:12	42:00	7143	14,286
2:08	4:16	8:32	21:20	25:36	42:40	7031	14,063
2:10	4:20	8:40	21:40	26:00	43:20	6923	13,846
2:12	4:24	8:48	22:00	26:24	44:00	6818	13,636
2:14	4:28	8:56	22:20	26:48	44:40	6716	13,433
2:16	4:32	9:04	22:40	27:12	45:20	6618	13,235
2:18	4:36	9:12	23:00	27:36	46:00	6522	13,043
2:20	4:40	9:20	23:20	28:00	46:40	6429	12,857
2:22	4:44	9:28	23:40	28:24	47:20	6338	12,676
2:24	4:48	9:36	24:00	28:48	48:00	6250	12,500
2:26	4:52	9:44	24:20	29:12	48:40	6164	12,329
2:28	4:56	9:52	24:40	29:36	49:20	6081	12,162
2:30	5:00	10:00	25:00	30:00	50:00	6000	12,000

If, at any time in the class, something is not clear, please ask. I also gladly accept ideas on how to improve this reader. Thanks for making it better for the next class!

INTENSITY PROFILE

CONCEPT II PACE TRAINING TABLES—PACES

2,500 m Test Results		Training Paces (min:sec per 500 m)			
Total Time	MaxPace	60% pace	70% pace	80% pace	90% pace
13:50	2:46	3:18	3:08	3:00	2:52
13:40	2:44	3:16	3:06	2:58	2:50
13:30	2:42	3:14	3:04	2:56	2:48
13:25	2:41	3:12	3:02	2:54	2:47
13:15	2:39	3:10	3:00	2:52	2:45
13:05	2:37	3:07	2:58	2:50	2:43
12:55	2:35	3:05	2:56	2:48	2:41
12:45	2:33	3:03	2:53	2:46	2:39
12:35	2:31	3:01	2:51	2:44	2:37
12:25	2:29	2:59	2:49	2:42	2:35
12:20	2:28	2:56	2:47	2:40	2:33
12:10	2:26	2:54	2:45	2:38	2:31
12:00	2:24	2:52	2:43	2:36	2:29
11:50	2:22	2:50	2:41	2:34	2:27
11:40	2:20	2:48	2:39	2:32	2:25
11:30	2:18	2:45	2:37	2:30	2:24
11:25	2:17	2:43	2:35	2:28	2:22
11:15	2:15	2:41	2:32	2:26	2:20
11:05	2:13	2:39	2:30	2:24	2:18
10:55	2:11	2:36	2:28	2:22	2:16
10:45	2:09	2:34	2:26	2:20	2:14
10:35	2:07	2:32	2:24	2:18	2:12
10:25	2:05	2:30	2:22	2:16	2:10
10:20	2:04	2:28	2:20	2:14	2:08
10:10	2:02	2:25	2:18	2:12	2:06
10:00	2:00	2:23	2:16	2:10	2:04
9:50	1:58	2:21	2:14	2:08	2:02
9:40	1:56	2:19	2:12	2:06	2:00
9:30	1:54	2:17	2:09	2:04	1:59
9:20	1:52	2:14	2:07	2:02	1:57
9:15	1:51	2:12	2:05	2:00	1:55
9:05	1:49	2:10	2:03	1:58	1:53
8:55	1:47	2:08	2:01	1:56	1:51
8:45	1:45	2:06	1:59	1:54	1:49
8:35	1:43	2:03	1:57	1:52	1:47
8:25	1:41	2:01	1:55	1:50	1:45
8:15	1:39	1:59	1:53	1:48	1:43
8:10	1:38	1:57	1:51	1:46	1:41
8:00	1:36	1:54	1:48	1:44	1:39
7:50	1:34	1:52	1:46	1:42	1:37
7:40	1:32	1:50	1:44	1:40	1:36
7:30	1:30	1:48	1:42	1:38	1:34
7:20	1:28	1:46	1:40	1:36	1:32
7:15	1:27	1:43	1:38	1:34	1:30

Stroke Rate:

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