

2015-2016 Winter O'/WIOL Course Design Guidelines

ARE YOU A COURSE DESIGNER? Even if this is your first time, you know the symptoms:

- You think of great route choices you enjoyed and legs you would have designed differently.
- You wonder about the process used to get to really enjoyable courses.
- You enjoy looking at a map and creating mental routes with lots of decisions to make.
- You enjoy exploring nature and discovering exciting parts of it to share with others.
- You want to see happy finishers clustered in boisterous groups, excitedly discussing your event, including great route choices they enjoyed and legs they would have designed differently.

Welcome to the WIOL/Winter O' series. This guide is intended to help you design the best possible courses, building on decades of proven processes and techniques while still adapting to feedback about how to improve the season and the courses.

The WIOL/Winter O' series consists of eight meets of eight courses each, from beginner to advanced. The goal of this series is for students and adults from novice to expert to enjoy orienteering while gradually building navigational skills. You know you have achieved this if participants stand around afterwards with maps, excitedly comparing route choices—this is your most positive user feedback.

In recent years, we have started using a course team of Course Designer and Assistant Course Designer, both also setting controls the day of the meet. This approach allows experienced course designers some relief the day of the event, helps mentor new course designers, and allows for a level of vetting as well. You will also be working by mail and phone with a Course Consultant who helps you adapt the courses you want to set to the known success factors in these guidelines.

Four quick steps to get started:

1. Read pages 1-3 of this guide (Contents & Common Pitfalls).
2. Get a venue map and contact info from the Series Director.
3. Load Purple Pen onto your computer. It's free. Directions are on Page 4.
4. Contact the COC Land Permission Coordinator (coc.land.permission@gmail.com) to get venue contact info and ask if there are any new environmental concerns.
5. Contact the Course Consultant to check in and set expectations about timely communication.

Jud Kelley

Director, Washington Interscholastic Orienteering League: www.cascadeoc.org/wiol

Event schedule: www.cascadeoc.org/upcoming-events

Quick Reference:

There are no design target changes since last year. However, be aware—as last year—that the required side-by-side start canopies will need some space. Plan accordingly. Work early with the WIOL Director and Course Consultant to determine early where you anticipate having Start, Finish, Download, Registration, and Parking.

You will be designing 8 courses. Pages 3 and 5 give more detail about design targets. How you split these courses between yourself and your co-designer is up to you.

RECREATIONAL START TENT	WIOL START TENT
Beginner	Elementary (boys & girls)
	Middle School (boys & girls)
Intermediate	JV Girls
	JV Boys North
	JV Boys South
	Varsity (boys & girls)
Short Advanced	
Long Advanced	

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Avoid These Common Pitfalls

Before designing a good course, it is critical to understand what makes a bad course—one that causes us to lose access to the park, causes logistical nightmares at Start or Finish, injures participants, or any of numerous other self-inflicted problems.

Before you even begin design work, read this list carefully twice. Afterwards, review your completed courses against this list before you submit courses to the Course Consultant **three weeks before your event**. Then you at least know for certain that your courses start out “not bad” and not late. NOTE: This list is also the first thing the Course Consultant checks against!

In priority order...

Environmental problems:

Environmental concerns can get us kicked out of a park for future usage, requiring years of effort to rebuild trust with land manager, if at all. Make sure none of these happen:

1. Routes or controls that encourage running up or down a **steep slope** that is not already a park-recognized trail (otherwise you create your own elephant trail).
2. Controls placed next to water on **unstable ground** or routes that encourage traversing unstable ground.
3. **Stream crossings** in undefined, unstable, or muddy, non-hardened locations (A “hardened” location is one that can withstand repeat foot traffic, such as rocks, bridge, or very large log for advanced users).
4. Be very cautious of courses that cross **soft maintained ground** such as wet ballfields in ways that will cause damage and negatively affect other users of the park.
5. Routes that cross known **nesting or breeding areas** in-season (Don’t know? Ask!).
6. Routes that cross **new plantings** or areas of **sensitive species** population management.
7. Courses that go off-trail in a venue where this is not allowed.

Start/Finish problems:

Start/Finish problems can result in high numbers of missed start punching, missed downloads, orienteers starting out lost, and injuries at the finish.

1. A “**spinning Start**” that does not allow for organized departure of waves of simultaneous participants in the same 180-degree direction.
2. A “**spinning Finish**” that does not corral finishers in an organized manner from the same 180-degree direction.
3. The Start area **running through** the Finish area or vice versa (or through Registration).
4. A steep downhill run into the Finish that may cause **dangerous falls**.

Courses out of spec:

WIOL courses are designed to deliver increasing challenges to students of increasing ability, and parity of challenge at the same level. Courses out of spec introduce a mismatch against participant expectations for a fair, challenging course:

Names	# of courses	Winning Time	Length	# of Controls
Beginner/Elementary	1	15-20 min	1.1-1.6 km	6-10
Middle School	1	20-25 min	1.6-2.8 km	7-12
Intermediate/JV Girls, JV Boys N, JV Boys S	3	20-25 min	2.5-3.3 km	8-14
Short Advanced, Varsity	2	25-30 min	3.3-4.4 km	8-14
Advanced	1	40-50 min	4.5-6 km	8-16

TOTAL COURSES **8**

Leg problems:

Leg problems run the gamut from environmentally dangerous to unfair or simply boring:

1. Courses going through **off-limits** areas (At a minimum, bend the course lines around them).
2. Route choices that go into **environmentally sensitive** areas.
3. Route choices that cross areas where **passage is unclear** on the map.
4. **Doglegs**: sharp angles on the course that make earlier orienteers guide following orienteers into the control, reducing the value of navigation.
5. Using the same leg (even part of it) in the **opposite direction** with another course, introducing both a navigational aid and the increased chance of collisions between active map readers.
6. Using a leg (even part of it) **more than once**, introducing boredom.
7. Legs that are **inappropriate for the skill set** at that level of experience.
8. Courses that are not shortened to accommodate steep climbs or lengthened for flatness, causing **excessively long or short winning times**.

Control placement problems:

Control placement problems change the sport from an enjoyable test of navigation to a frustrating test of patience (if too hard) or a waste of time (if too easy).

1. "Tricky" or **hidden controls** that are difficult to find once the feature is identified and the orienteer is in the right place
2. Control flags **visible from a long distance** away (unless for Beginner/Elementary)
3. Controls on features that are **not marked on the map** or are in areas of known map inaccuracy
4. Controls placed on **linear features** with no other reference
5. Controls (especially similar feature controls) within **30 meters** of one another.

Using Purple Pen to create WIOL/Winter O' Courses.

Purple Pen is available for free download from: <http://purplepen.golde.org/>. If you need any additional guidance beyond what's in the overview below, contact the WIOL Director.

Get ready.

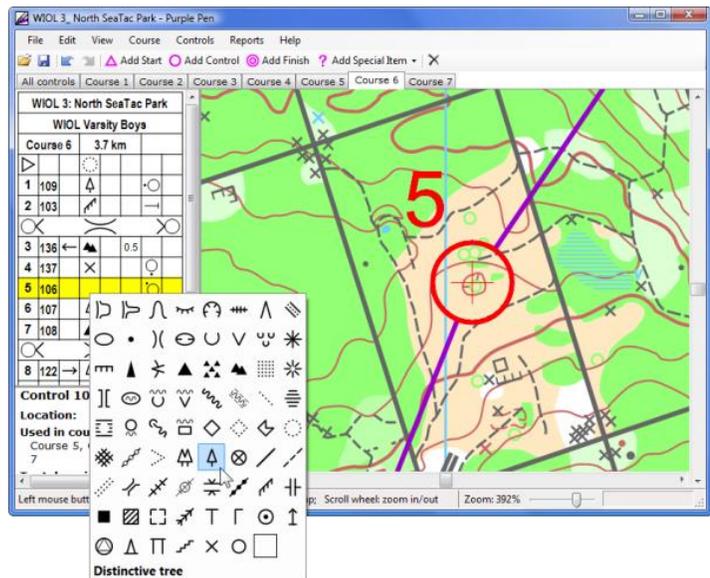
1. Create a file director and put your map file in it. Your map file can be an OCAD file or PDF, but OCAD is preferred for the WIOL/Winter O' Series. Know your map scale.
2. Open Purple Pen and select New Event. When it asks for a map file, point it to yours, and tell it the map scale.
3. Change the starting control from #31 to #101 to match our control set.
4. Change View>Zoom to 150% to view the map detail more easily.
5. Place the Start (click Add Start in the magenta menu, then click location) and Finish (click Add Finish, then click location)

Add controls.

1. Select Add controls from the magenta menu, and select locations.
2. For each control select an appropriate feature description.
3. Repeat until all your controls are included.

Create courses.

1. Select Course>Add Course for all courses, naming as shown in right, with two course 4s (4N and 4S).
2. For each course, and following the design guidelines in subsequent pages of this guide, go through the controls in order and select Add Control and a location for each. Purple Pen should snap to a pre-existing control you have already entered, adding it to your course.
3. For each course, select Add Description and draw a diagonal line on your map. You can now move and resize the description block. It also tells you how long each course is.
4. Adjust your course lengths and route choice by moving controls or selecting different options. The Course Consultant can be a huge asset here. Just share the map and Purple Pen file.



Design Principles.

Although the meets get more technically demanding as the season progresses, with the second half of the season allowing off-trail events, it is important that all meets are set with consistent awareness of the same design principles. Courses should be fun, fast, and fair. An interesting course is a fun course, so vary your courses by terrain, tempo, and technique.

These three rules will help you start out with good course design:

- 1. Make courses interesting.** It helps if you design the longest leg first on each non-beginner course to find the optimum combination of navigation decisions in one amazing leg. The factors below make a fun, fast, and fair course of different legs:
 - **Terrain changes:** woods/fields, manmade/natural, spurs/reentrants, detail/low detail
 - **Tempo changes:** short/long legs, rough/precision orienteering, up/flat/downhill
 - **Technique changes:** you are testing for these skills on your courses--quick decisions, over or around, handrails, pace counting, aiming off, catching features, attack points, contouring, control extension, funneling...
- 2. Design to the right level of navigation.** Know the navigational expectations at each level. Legs are more important than controls, so design for legs first, and then select useful controls.

The technical levels described below should be considered maximum technical difficulties for any leg on that particular course. It's fine and even desirable to have some or even many easier legs. This tests the competitors' ability to change speed, and allows the less skilled participants to get around the course in a reasonable amount of time. There should be at least a few legs at the maximum technical difficulty for that course, so that the technically skilled participants come out on top.

Navigational Challenge	Begin, Elem	Middle School	Intermed, JV	Short Adv., Varsity	Long Advanced
Prominent control features	✓	✓	✓		
Navigating with a handrail	✓	✓	✓		
Off-trail navigation (when allowed)		✓	✓	✓	✓
Varied leg length		✓	✓	✓	✓
Choose between fast or easy		✓	✓	✓	✓
Similar features (avoid parallel error)			✓	✓	✓
Control on opposite side of feature			✓	✓	✓
Small control features				✓	✓
Maximum route choice				✓	✓
Few if any handrails				✓	✓
Speed and bearings change					✓
Best attack point behind the feature					✓
Point objects that require a compass					✓

Remember, every leg where you offer route choice is another opportunity for the “pack” to separate by choice and ability, allowing orienteers to run their own race.

- 3. Adjust for course length and climb.** The ultimate measure of a course's difficulty is its winning time. To achieve within the range, pay close attention to course length and climb. Course length early in the season should be at the lower end of the range. As the season progresses, course lengths should increase in length to the middle to upper end of the range. Flat venues should be from the middle of the range to the upper end of the range, with hilly ones being more at the low end. Multiply any vertical climb by ten to get an approximate distance equivalent.

For example, treat a 3K course with 100M climb as a 4K course. $(3K + (10 \times 100M)) = 4K$

JV Girls and JV Boys (North and South) should be within 100 meters of comparable length.

How To Make The Design Process Easier.

Introduce yourself early. It's tough to retrofit courses around a sudden restricted area discovery! Legs should routinely avoid crossing wetlands, streams and other sensitive areas. Before you begin, have a discussion with the ranger or other local land manager to identify any dangerous, sensitive, or congested areas to be worked around in the course design process, and verify the level of off-trail access we have. Meets early in the season may require on-trail usage only. But an introduction and discussion helps build relationships and credibility. This is the person you will share your courses with before they are printed.

Use Your Design Team. You don't have a whole event on your shoulders anymore—it's eight courses between the two of you. Does it make sense to do all of them together as mentor/mentee, or split between beginner and advanced courses, or another plan that works best for you?

Get early design feedback. To help with consistency during the season, we now use a Course Consultant, who can help you get the most value out of each map for that point in the season. Run your maps past the Course Consultant at least two weeks before the event date. Better yet, speak with the Course Consultant early in the planning process to get tips about course setting in that park and what courses have been done recently. This season's course consultant is **Peter Golde** (peter@golde.org).

Offload your printing. Once you have reviewed your courses with the Course Consultant, make sure that all of your control numbers on all courses are easily visible against the lightest backgrounds possible in those areas. All courses will have course descriptions printed on the map, but Beginner/Elementary is the only map with symbols and text.

Then send your OCAD file and Purple Pen file together to the WIOL Director (this season's WIOL Director is Jud Kelley at jkelly@bethelsd.org) a minimum of one week prior to the meet. He will print the appropriate quantity of each course and controls descriptions, and get them to the Start crew at the meet. All you'll need to do on meet day is put out the control markers.

Get reimbursed. All course designers get 20 volunteer points for WIOL/Winter 'O meets. And if your venue is >25 miles from your home (50 miles round trip), you get reimbursed \$0.25/mile

over 50 miles for for up to 3 trips, plus a night's lodging at \$60/night.

Some Final General Thoughts.

Be careful about sharing controls. Elementary/Beginner participants can get lost easily, so this course should rarely share controls with other courses. There can be sharing of controls on JV/intermediate, varsity, and advanced courses. A single control is NOT to be shared by more than three courses because of environmental impact.

Watch control proximity. From the IOF standard:

3.5.5 Proximity of controls

Controls on different courses placed too close to one another can mislead runners who have navigated correctly to the control site. According to Rule 19.4, controls shall not be sited within 30 metres of each other (15 metres for map scales 1:5000 or 1:4000). Only when the control features are distinctly different in the terrain as well as on the map, should controls be placed closer than 60 metres (30 metres for map scales 1:5000 or 1:4000).

19.4 Controls shall not be sited within 30 metres of each other (15 metres for map scales 1:5000 or 1:4000). (see also Appendix 2, #3.5.5).

Crossing over. Courses may cross themselves or loop back close to themselves, since electronic punching prevents punching controls out of order. This also changes direction and makes the course interesting. However, excessive crossing can be confusing to read; minimize any possibility of misreading the map or going to the wrong control point by accident.

Planning the start. Later orienteers sometimes gain a time advantage by simply watching the orienteers who start ahead of them run in the direction of the first control. This inequity can be eliminated by having a flagged route that participants walk to a hidden start. If you use a hidden start, we will need another start volunteer, so share your ideas early.

Planning the finish. Strongly consider having the last control common to all courses, with the run from the last control to the finish being easily visible to spectators—but include multiple e-punch boxes to eliminate a line. Avoid a steep downhill run to the finish. The finish control will be at the beginning of the finish chute to the download area.

Unexpected situations. If you find on the day of the meet when placing controls in the terrain that something changed since you checked the controls the last time (storm, construction work, park maintenance, etc.), favor fairness over difficulty. Place the control flag in a place near the control point so that it can be found based on navigation without searching the terrain.

Specific Course Guidance.

WIOL Elementary/Recreational Beginner

Winning time about 15-20 min. (This will mean about 1.1-1.6 km in length with 6-10 controls).

- a) Make the first two or three points particularly easy.
- b) Keep every leg along well-marked trails or a similar linear feature such as a road, stonewall, field edge, stream or the like. Place controls at points where the linear feature changes.
- c) Generally the legs should be kept fairly short.
- d) Large or very distinct features are preferable as they encourage map to terrain identification. Pick precise spots, and place the control well visibly.
- e) Check the other courses to ensure that there are no nearby controls from them to confuse the White course runners. It is better that they cannot see controls from other courses that might pull them off course or cause them to mis-punch.

WIOL Middle School

Winning time about 20-25 min. (This will mean about 1.6-2.8 km in length with 7-12 controls).

- a) This course takes the runner from the trail into the woods. It will follow linear features, but leaves and returns to them while visiting control points. The linear features used this course handrails can have small gaps or be less obvious than needed for the Elementary course.
- b) This should still be an easy course. Confine the technical difficulty to a rather narrow range, offering a wide variety of features to navigate by and the need to begin to use the compass to find the control point. Attack points for this course should be a feature suitable for the beginner. Choose control sites that encourage course orienteers to return to linear features for route choices.
- c) More than one route choice from control to control is suggested. We want to start testing navigational skills, and begin to introduce the need for contour reading, just being able to distinguish uphill and downhill is enough. Emphasize the need for following the map, but throw in a little compass work such as shortcuts through open woods, but only if the distance is relatively short, and provided that a catching feature exists.
- d) Vary the lengths of the legs, but tend toward keeping them short. Legs should be longer than

elementary, but short enough that they don't lose concentration.

- e) Use rather obvious features, such as top of a small hill, North side of pond, ditch junction. Avoid using reentrants or other contour features for control points. All control features must have nearby attack points on handrails and catching features.
- f) Control flags should not be visible from the linear feature used for the main handrail
- g) There should be an obvious catching feature shortly after the control when approached from the attack point. Controls may be located on the catching feature.

WIOL High School JV Boys (South, North) & JV Girls/Recreational Intermediate

Winning time about 20-25 min. (This will mean about 2.5-3.3 km in length, with 8-14 controls). Length should be as close as possible for both courses.

- a) Boys JV (North and South) and Girls JV/Intermediate courses cannot share the first control, but they can share other controls with each other.
- b) The controls and best routes should invite the intermediate orienteer away from the strong linear features that the beginners must rely on. However, the penalty for navigational errors should not be extreme. Every course control must have at least one obvious an attack point and one obvious catching feature. If unsure, err on the side of too easy.
- c) Provide more route choice. Set a course that forces the orienteer to make several decisions per leg. Make sure that the competitor must continue to pay attention and think in order to execute his choice properly. The controls and best routes should invite the intermediate orienteer away from the strong linear features that beginners must rely on. Following linear features can and should be part of the route choice, but offer a faster off-handrail route whenever possible. Simplified contour reading should be encouraged.
- d) A mix of short and longer legs is desirable. The whole course should contain as much variety as feasible, including control features, direction, route choice and navigational problems.
- e) The control feature should be fairly prominent, larger point and contour features. Use the main reentrant, not the small side reentrant. The hill top, not the small cliff face on its side. Emphasize getting there, not fine navigation.
- f) The best routes should be those that require navigation via picking off features along the way and navigation along large contour and land features.
- g) Avoid using difficult-to-find point features as controls. While some legs can require almost-advanced navigation, always use large obvious control features at the end of the advanced leg.

High School Varsity (Boys & Girls) & Recreational Short Advanced

Winning time about 25-30 min. (this will mean about 3.3-4.4 km in length with 8-14 controls). Length should be the same, as close as possible, for both courses.

- a) These courses can share the first control with intermediate/JV courses.
- b) Use smaller features -- boulders, cliffs, small reentrants, spurs and knolls, small marshes, depressions, etc. Make the orienteer navigate to the control feature. If he is coming from the South, for example, place the control on the North side of the knoll or boulder.
- c) Try not to place controls too close to attack points or collecting features. Don't make the direct route the easier route.
- d) Don't design a course with legs or leg segments that requires little or no thinking, merely physical effort. Use short legs and positional controls to move the orienteer into more technical terrain or move the control site further away from larger and linear features.
- e) Try to avoid having the routes parallel to obvious linear features such as roads, trails, streams, fences or power lines.
- f) Make sure any attack points the orienteer will most likely use are, if possible, a good distance away and solid. Require constant concentration. Locating the control can require a short attack from an attack point, but should not require a long bit of navigation away from a good handrail, or the picking out of a small feature in a highly technical area.
- g) Longer legs that avoid obvious handrails and test navigational skill should be considered. Try to include at least one of these in this course.
- h) Maximize route choices and use of navigation skills. The navigationally most difficult route should be faster than the "easy way around." Offering multiple route choices that are hard to decide between is ideal.

Recreational Long Advanced (Winter O Competition)

Winning time will vary depending on the length of the course, which can be between 4.5-6 km in length with 8-16 controls). Course length can be short or long depending on map.

- a) Controls and legs should be as difficult as the terrain and agreement with the land owner allow. Controls need to be on mapped features, and a good navigator should always be able to quickly

and accurately navigate directly to the control, visible without searching. Check each location before finalizing the courses.

- b) Focus on interesting and tricky legs, not interesting and tricky controls! If possible, leg should allow for interesting route choice. The fastest way may not be the most obvious way. For example legs may vary by which one has a good attack point, whether to go over or around an obstacle, or whether to rely on safe navigation.
- c) Legs should generally not follow trails, or any other linear feature like streams or vegetation boundaries.
- d) Consider having at least one long leg, as long as that leg does not allow an easy road/path run. Also, consider a group of short legs in an interesting area.
- e) Use point objects rather than linear features. Navigation to point object controls requires using a compass, while linear features can be followed without a compass. Try to use point controls even if the leg has to follow a trail; place the control on the feature on the mapped feature on the side away from the trail.
- f) Change the bearing often. Avoid sharp angles because they allow approaching runners to guide off of earlier runners coming out of a control, decreasing the fairness of the race.
- g) Catching features should be behind controls, not in front of them. The best attack point for finding the control may be behind the control or not along the fastest route, allowing an interesting choice of safe vs. fast. Consider having a choice between over a hill or around it. Legs should have an opportunity for parallel error -- make the runner pick the right reentrant from two or three similar ones, or the right hill, or even the right trail.
- h) Look for opportunities to introduce parallel error, such as picking the right reentrant, tree, or boulder from several similar ones.
- i) To get a good length course, consider having the course cross itself. But make sure the course with the crossing is readable on the map. If the map is small, the course setter may wish to consider using a map exchange.