**ISE Entrance Submission – Golf Yardage Calculator – Mark Mannion**

**Introduction**

My entrance submission for the Immersive Software Engineering Programme 2025 entry is a personal passion project that I created for calculating distances/yardages on my home golf course, Fota Island Golf Club.

One of the main parts of golf is knowing what club to hit relative to the distance you have left on a hole. You can learn how far you carry the ball in the air to help with this problem which will enable you to hit better shots. However oftentimes the yardage that you have left into the green is a flat yardage without taking the slope of the hole, the wind speed or the temperature into account. In my project my main aim was to create a quick and easy to use tool on Python to bring all of these variables into the equation and make the task of gauging distance on the course a much simpler one.

**Data Collection**

I started this project by going to the golf club that I am a member at, Fota Island Golf Club and played a round of golf only using yardages that did not include the aforementioned variables. This resulted in being up to twenty yards short or long of the green in tricky spots due to not bringing the variables into the yardage. I then used a laser rangefinder to measure the slope of each of the holes on the course from four set yardages: 200 yards, 150 yards, 100 yards and 50 yards. The rangefinder uses a laser that reflects off the flag to give a highly accurate yardage. Using the slope function on the rangefinder I was able to find out that the variation in distance on a number of holes could be an increase or decrease of up to ten yards due to slope. For example on the 18th hole there is a severe drop off from the fairway to the green, this resulted in negative 3 degrees of slope which over a distance of 200 yards correlated to 9 yards less than the yardage without a slope.

After I had measured the degrees of slope and the corresponding increase/decrease in distance I decided to look at the effect that temperature has on the golf ball. Temperature isn’t one of the biggest factor on distance when it comes to the carry distance of a golf balls, however it can still affect the golf ball. According to various articles the standard carry distance for each golf club is when the temperature is at approximately 24 degrees celscius. For every increase/decrease of approx 5.5/6 degrees from that temperature the carry distance either increases or decreases by 2 yards. So for example if the temperature was to drop to 18 degrees celsius the carry would decrease by 2 yards as it is 6 degrees less than 24 degrees celsius.

The final variable which I looked at was wind which has a massive impact on the carry distance of the golf ball. According to research for every 10 mph of tail wind the ball will carry 10 yards farther which is usually equivalent to a whole club extra. The same principle applies to head wind, for every 10 mph of head wind the ball will carry 10 yards less.

**Creating the Programme**

After gathering all of the data I required, I created my Python Yardage. I started by creating user inputted variables for the temperature, wind speed, hole and yardage. I then created If/Elif statements for the wind and temperature. Instead of creating long if/Elif statements for the slope I created four functions based on different length yardages to make the programme more concise (200/150/100/50 yards).

The slope functions are kept as constant variables as they are based on my home course. If this programme was to be used for other courses these could become user inputted variables or even information stored on external data sets that can be called upon.

Finally, the programme suggests which club you should hit depending on the set clubs and corresponding distances that are in the programme. For example if you hit your 9 iron 160 yards and your 8 iron 170 yards the programme will recommend which club you should hit for the final adjusted yardage.

**Conclusion**

Overall I really enjoyed this project and seeing how to use programming to improve an everyday task. It was very interesting to learn so much about golf ball aerodynamics and the effect of multiple variables on distance in golf. This programme helps me make better decisions when getting yardages on course. My friends have tried it as well and have learned about the different factors affecting distance as well. I also learned a lot about functions, variables and If/Elif statements in Python which was great to further my knowledge of programming.

**Links to websites and documents that I used in my research:**

[Effect of Temperature on Golf Ball Dynamics](https://www.sciencedirect.com/science/article/pii/S1877705812017213)

[Hot vs Cold Golf Balls](https://mygolfspy.com/labs/hot-versus-cold-golf-balls/)

[How does cold weather affect golf ball performance?](https://seedgolf.com/blogs/news/how-does-cold-weather-effect-golf-ball-performance)

[What effect does temperature have?](https://www.andrewricegolf.com/andrew-rice-golf/2023/4/what-effect-does-temperature-have)

[How to calculate distance in the wind](https://www.golfmonthly.com/tips/golf-swing/how-to-calculate-distance-in-the-wind-108215)

[A better way to play in the wind](https://www.andrewricegolf.com/andrew-rice-golf/tag/wind+formula)

[Blowin' in the wind](https://www.paulhurrion.com/tuition/blowin-in-the-wind/)

[The effect of wind](https://www.scottsdalegolf.co.uk/blog/60-second-technique-tips/into-the-wind-vs-down-wind-the-effect-on-your-ball)

[How the wind affects your golf ball](https://www.golfwrx.com/318416/how-the-wind-affects-your-golf-ball/)

[A study of golf ball aerodynamic drag](https://www.sciencedirect.com/science/article/pii/S187770581100991X)

[The effect of ball temperature on ball speed and carry distance in golf drives](https://journals.sagepub.com/doi/abs/10.1177/1754337118812618)