Assistant Superintendent Certificate Series

Principles of Golf Course Agronomy Study Guide

GCSAA

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Principles of Golf Course Agronomy Exam Study Guide

Contents

Assistant Superintendent Certificate Series Exam Background

To enhance the competency-based continuing education curriculum for assistant superintendents, GCSAA enlisted subject matter experts to define the body of knowledge (BOK) an experienced assistant superintendent possesses. Following psychometric principles for exam and study guide development, subject matter experts developed an exam testing experience and professional competence for assistant superintendents.

Successful completion of an exam demonstrates experienced professional competence as an assistant superintendent in that domain of expertise. Completion of all components of the series results in achievement of the GCSAA Assistant Superintendent Certificate, and demonstrates comprehensive professional competence for an assistant superintendent.

The information and resources in this study guide are designed to help prospective test takers prepare for the Principles of Golf Course Agronomy exam. Included in this guide are the categories and associated competencies that will be tested and the specific testing objectives for this exam.

This resource will enable test takers to evaluate areas of existing proficiency and identify areas where additional study or practical experience might be needed. The guide also provides suggested resources for self-study and sample exam questions.

Study and preparation are essential components for success on any exam. However, real-world, hands-on experience is necessary to demonstrate competence as an assistant superintendent. Studying alone will not adequately prepare an exam taker to pass the exam.

Exam Structure and Testing Requirements

The Assistant Superintendent Certificate Series exams are online, open book exams. You will need a computer with internet access and a printer. For this exam, you may use a calculator, and it would be beneficial to have one available.

The Principles of Agronomy exam consists of 71 multiple choice questions that must be completed within a 3-hour timeframe. Exam questions may be accompanied by descriptive scenarios, illustrations, charts, graphs and other visual elements. The testing software will pause for a brief break at the 90-minute mark and will resume 5-minutes later. The entire exam must be completed in a single session. A passing score consists of 46 or more correct answers. Upon successful completion, you may print a personalized certificate.

If you are unsuccessful at your first attempt to pass the exam, your exam fee covers an additional attempt at no additional charge. If you are unsuccessful after both attempts, you will need to purchase the exam again for another two attempts.

Self-Evaluation

In the next section are the Principles of Golf Course Agronomy categories, competencies and testing objectives. As you read, score yourself on what you think your level of mastery is in each area. Label each of the objectives with a number from 1 to 5 using the following scale. 5 – I could do that in my sleep. 4 – I'm comfortable with it, but not an expert. 3 – I know the topic, but I might need help. 2 – I'm aware of the topic, but haven't ever worked with it. 1 – I've never seen it before.

Once you have completed your scoring, review and consider the following:

Did you score more than half the topics as a 3 or lower? If so, additional practical experience and/or mentoring may be needed for you to pass the exam.

For any category that you scored a 5, you have a strong foundation but a refresher prior to the exam would be helpful.

Anything you scored a 3 or 4, you will probably need to improve your knowledge base with additional study or hands on experience.

Categories, Competencies and Testing Objectives

1. Category - Turfgrass Cultural Practices

a. Competency – Understand Plant Biology

i. Testing Objective – Identify basic turfgrass plant structure and anatomy, species identification and characterization, morphology, adaptation, metabolism and plant growth mechanics.

ii. Testing Objective – Given a scenario, identify the characteristics and qualities that should be considered when determining which turfgrass cultivars are best for the golf facility.

iii. Testing Objective – Identify the role nutrients play in plant growth and health.

b. Competency – Manage Fertilization

i. Testing Objective – Given a scenario (turfgrass species, fertilization application technique, formulation) identify correct fertilizer and plant protectant application rates and procedures.

c. Competency – Manage Irrigation

i. Testing Objective – Identify the water usage of various turfgrass varieties given specific environmental conditions.

ii. Testing Objective – Identify the characteristics of effluent water.

iii. Testing Objective – Identify irrigation system problems, components, and recommended maintenance procedures, including flow management, pressure in the pump station, amperage used, operating pressure, static pressure, leaks, etc.

iv. Testing Objective – Identify issues with poor water quality (pH, bicarbonates, etc.)

v. Testing Objective – Identify the principles of irrigation system design and function (pump station issues, pressure issues, etc.)

vi. Testing Objective – Identify characteristics of types of irrigation systems, adjustments to the irrigation system and procedures to suit turfgrasses and other vegetation, soil types, selected cultural practices, fertilizer and plant protectant practices, weather changes, course conditions, and playability.

d. Competency – Manage Primary Turfgrass Practices

i. Testing Objective – Given a scenario, identify factors (turfgrass type, how it is used, weather, location, season, nutrient requirements, etc.) associated in determining the appropriate height of cut for specific types of turf.

ii. Testing Objective – Identify appropriate turfgrass cultural practices, such as seeding/sodding, fertilization, irrigation, weed control, soil cultivation, verti-cutting, grooming, mowing and topdressing.

iii. Testing Objective – Identify the seasonal adjustment practices for water, fertilization, mowing, winterization and plant protectant products.

iv. Testing Objective – Given a scenario, identify maintenance programs to minimize turfgrass stress problems (shade, drought, heat, traffic, cold, salinity, flooding, pests, etc.).

e. Competency – Manage Supplementary Turfgrass Practices

i. Testing Objective – Identify the characteristics of various supplementary turfgrass cultural practices including coring, drilling, slicing, spiking, vertical mowing, rolling, topdressing, wetting agents, soil amendments, colorants, plant growth regulators and water-injection on the golf course.

ii. Testing Objective – Identify considerations when determining which topdressing materials to use for turfgrass.

2. Category - Golf Course Landscapes

a. Competency – Construct and Renovate

i. Testing Objective – Identify the requirements (water, nutrition, mowing, pest management) of establishing turfgrass.

ii. Testing Objective – Identify the requirements and/or recommendations for the construction or renovation of greens (USGA spec, California, native soil) including slope, size, grassing, drainage, location, configuration, irrigation and soil analysis.

iii. Testing Objective – Describe the optimal (when and how) cultural

practices, advantages and disadvantages for construction and renovation for each establishment method (sodding, sprigging and seeding).

iv. Testing Objective – Identify potential impacts to watersheds and drainages by proposed construction and grow in activities.

v. Testing Objective – Identify the factors (soil analysis, orientation, topography, microclimate, access to utilities, etc.) needed for development of a site description or analysis report.

b. Competency – Manage Bunkers

i. Testing Objective – Identify the characteristics of a well-functioning bunker design.

c. Competency – Manage Other Infrastructure

i. Testing Objective – Given a scenario, identify how to design, layout, install and maintain different types of drainage systems.

3. Category - Pest Management

a. Competency – Understand Pest Management

i. Testing Objective – Given a picture and/or description of a pest (insects, diseases, weeds, vertebrates and invertebrates) identify the pest.

ii. Testing Objective – Given information involving fertilizers and plant protectants, interpret the label (active ingredient, timing, target pests, PPE requirements, etc.). Interpret the SDS document and identify use restrictions.

b. Competency – Incorporate Integrated Pest Management

i. Testing Objective – Identify basic pests (weeds, insects, diseases, nematodes, vertebrates, etc.) and their appropriate management and controls.

ii. Testing Objective – Identify characteristics of pest control product. Describe pest control product selection and application procedures. Identify the effective IPM (scouting, pest identification, threshold value, cost effectiveness, environmental impact) solution - including the adjustment of cultural practices to avoid pest problems.

4. Category - Equipment

a. Competency – Manage Equipment

i. Testing Objective – Identify proper calibration techniques for golf course equipment (volume measurement equipment, liquid and dry chemical applicators, etc.).

ii. Testing Objective – Identify proper procedures and equipment for safe operation of golf course equipment.

iii. Testing Objective – Given a scenario, determine the most effective manner for acquiring golf course equipment, including purchasing and leasing.

iv. Testing Objective – Given a scenario, identify symptoms of equipment performance problems and resolve the problems.

5. Category - Rules of Golf

a. Competency – Manage the Course to Accommodate the Rules of Golf

i. Testing Objective – Given a scenario, identify the correct application of the Rules of Golf and etiquette of golf.

ii. Testing Objective – Identify the course set up to conform to the Rules of Golf, including marking and setting up the course.

Exam Sample Questions

Below are ten sample questions from the Principles of Agronomy exam. These exact questions will not appear on the exam. However, they will provide exam takers an idea on what to expect regarding the format of the questions and the level of difficulty.

Question 1

What is the name of the highly compressed stem located at the base of a vegetative aerial shoot?

a. Stolon
b. Crown
c. Rhizome
d. Coleoptile

Question 2

Which nutrient helps lower pH in the soil to the preferred pH range for favorable turfgrass growth?

a. Sulfur
b. Calcium
c. Manganese
d. Magnesium

Question 3

You are designing and installing an PVC piped irrigation system. You need to check the water velocity.

What is the industry accepted maximum water velocity that can be used?

a. 5psi (34.5 kPa)
b. 5fps (1.52 mps)
c. 8in/hr (20.3 cm/hour)
d. 80gpm (302 liters/minute)

Question 4

A soil sample indicates that there is a potassium deficiency.

What is the appropriate method of correcting this deficiency?

a. Mowing
b. Irrigating
c. Fertilizing
d. Seeding/sodding

Question 5

Overnight temperatures have been 25 Fahrenheit (-3 Celsius) and you notice discolored "footprints" on several of greens due to frost damage.

What is the cause of this visual damage?

a. Lack of proper plant hydration
b. Collapse of the plant cell nucleus from foot traffic
c. Collapse of the cell walls from foot traffic on live turf
d. Damage to the turf roots from foot traffic on frozen turf

Question 6

What is a primary benefit of applying a wetting agent?

a. Creates pore space
b. Improves transpiration
c. Creates hydrophobic soils
d. Increases water distribution

Question 7

What is the correct definition of overseeding?

a. Seeding using pre-germinated seed
b. Seeding by spraying a solution of seed, mulch, and fertilizer
c. Seeding between plugs, sprigs, or already established turf to improve a stand or alter its composition
d. Seeding onto an existing turf to provide green and active turfgrass growth during dormancy of the original grass

Question 8

Which pest has caused the damage shown in the picture?

a. Deer
b. Mole
c. Gopher
d. Racoon

Question 9

Upon spraying greens, a consistent line across each green indicates sprayer malfunction.

What is the most-likely problem?

a. Nozzle choice
b. Sprayer speed
c. Clogged nozzle
d. Sprayer calibration

Question 10

What is the defined area of the teeing ground?

a. Anywhere on the tee box behind the tee markers
b. A rectangle between the tee markers extending back two feet
c. A rectangle between the tee markers extending two club lengths back
d. A rectangle between the tee markers one club length forward and one club length back

Answers to Sample Questions

1. B
2. A
3. B
4. C
5. C
6. D
7. D
8. D
9. C
10. C

Recommended Resources

The following resources will be beneficial in preparing for the exam. These resources are not the sole source of exam content. Practical work experience is recommended to successfully complete the exam.

GCSAA On-Demand Webinars

For the most current listing and to access webinars, visit GCSAA's Learning Hub *and select category ASCS Prep*

Bolster Turf's Ability to Use Natural Defenses Against Stress

Calibrating Your Sprayers and Selecting the Right Nozzles

Effective Mower Configurations to Optimize Putting Green Playability

Electrical Technology

Equipment Issues and the Golf Turf Care Center

Factors that Affect Pesticide Fate and Behavior on the Golf Course

GDDs for Timing PGR Applications and Re-Applications

Golf Course Marking: Why we do it this way

Herbicide Resistance in Turf: An Emerging Issue Facing Golf Course Superintendents

How to Read Your Soils Report

Increase the Precision of Your Nitrogen Application

Irrigation: Science, Art and Measuring for Success

Making PGRs Work for Your Turf

Moss and Algae: How to Identify and Manage These Nuisance Pests

Optimizing Your Annual Bluegrass Weevil Management Program

Reclaimed Waste Water for Turf Irrigation

Reducing Poa Annua on Your Golf Course

Review Your Bentgrass Greens Management Plan

Sand Topdressing Programs – Benefits and Challenges

Update on Fairy Ring Control

Other Resources

Baird, James H., *Soil Fertility and Turfgrass Nutrition 101*

Barrett, James, Brian Vinchesi, Robert Dobson, Paul Roche, and David Zoldoske, *Golf Course Irrigation, Environmental Design and Management Practices*

Beard, James B., *Turf Management for Golf Courses*

Calhoun, Ronald, *Crabgrass Control in Home Lawns*

Christians, Nick E., *Fundamentals of Turfgrass Management*

Christians, Nick E. and Michael L. Agnew, *The Mathematics of Turfgrass Maintenance*

Danneberger, Tom Karl, *Turfgrass Ecology and Management*

Deveau, Jason, *Validate Sprayer Output – Nozzle Calibration*

Dodson, Ronald G., *Sustainable Golf Courses*

Dore-Smith, David, *Copperleaf Golf Course Maintenance*

Emmons, Robert and Frank Rossi, *Turfgrass Science and Management*

Fry, Jack and Bingru Huang, *Applied Turfgrass Science and Physiology*

Gross, Pat, *The How and Why of Vertical Mowing Greens*

Guertal, Beth and Han, Dave, *Aeration and Soil Compaction in Turf*

Harivandi, Ali, *Using Recycled Water on Golf Courses*

Huang, Bingru, *Turfgrass Water Requirements and Factors Affecting Water Usage*

Hurdzan, Michael J., *Golf Course Architecture: Design, Construction & Restoration*

Kansas State University, Research and Extension, *Mowing and Trimming Safety for the Landscaping and Horticultural Services Industry*

Kenna, Michael P. and Snow, James T., *Wastewater Reuse for Golf Course Irrigation*

Landschoot, Peter, *Turfgrass Fertilization: A Basic Guide for Professional Turfgrass Managers*

Lowe, Todd and Vavrek, Bob, *Managing Bunkers*

McCarty, L.B., *Best Golf Course Management Practices*

Michigan State University Turf Diseases

Moss, Justin Quetone and Michael Kress, *Turf Irrigation Water Quality: A Concise Guide*

Murphy, James, John Inguagiato, Bruce Clarke, *Cultural Control Strategies for Anthracnose*

Nebraska Institute of Agriculture and Natural Resources, Extension Wildlife, *Damage Management*

Peacock, Charles H., Grady L. Miller, and Matthew C. Martin, *Irrigation Water Quality Problems*

Schmidgall, Raymond S., *Superintendent's Handbook of Financial Management*

Tani, Toshikazu and James B. Beard, *Color Atlas of Turfgrass Diseases*

Turgeon, A.J., *Turfgrass Management*

Turgeon, A.J. and J.M. Vargas, Jr., *The Turf Problem Solver*

United States Department of Labor, Occupational Safety and Health Administration, *Hazard Communication Standard: Safety Data Sheets*

USGA Green Section Staff, *Recommendations for a Method of Putting Green Construction*

USGA, *How to Conduct a Competition*

---*Rules of Golf*

Vargas Jr., J.M., *Management of Turfgrass Diseases*

Vittum, Patricia J., Michael Villani, and Haruo Tashiro, *Turfgrass Insects of the United States and Canada*