



Collegiate Turf Bowl Competition Study Guide

GCSAA would like to thank Leah Brilman, Ph.D., turfgrass product manager DLF USA, and Gwen Stahnke, Ph.D., facilitators of the Turf Bowl, for their work updating and modifying the exam each year.

The 2025 Turf Bowl Competition will consist of a single exam that will be administered electronically. It will include multiple choice questions covering the areas of study listed in this study guide and the physical and visual identification of samples. The top 10 teams will earn prizes.

Eligibility

To participate in the GCSAA Collegiate Turf Bowl Competition, students must meet all the following eligibility criteria:

- Must be currently enrolled in a turf program or have graduated at the end of the most recent fall semester but not yet entered a graduate program
- Be an active Student member with GCSAA
- Be a registered attendee at the GCSAA Education Conference and Golf Industry Show

Important Dates

- December 4, 2024
 - Team rosters with captains identified due to Diana Kern at dkern@gcsaa.org
- February 5, 2025
 - Turf Bowl Luncheon – 11:30 – 1 pm San Diego Convention Center
 - Turf Bowl exam – 1 – 4 pm San Diego Convention Center
- February 6, 2025
 - Results announced at GCSAA Send-off Celebration 3:15 – 4:30 pm

Areas of Study

Turfgrass Identification

- Identify turf specimens by their common names or traits.
- Know common name vs. scientific name.
- Identify seed of turfgrass species
- For specific turfgrass species, please see Addendum 1.

Turfgrass Growth and Development

- Identify parts of the grass plant.
- Know management and environmental factors that influence growth.
- Understand turfgrass physiology and how it is influenced by management practices.
- Understand plant growth regulators – Use and influence on biology

Turfgrass Soils and Soil Fertility

- Know greens construction, particle sizes, soils and fertility.
- Know of macronutrients and micronutrients, and their influence on growth.
- Soil types and classification
- Read and interpret a soil report

Weed Identification and Control

- Identify common weeds. Note: Any turfgrasses on list can also be weeds.
- Know herbicides, what weeds they control and mode of action.
- Know the life cycle of weeds and how management influences weed growth.
- Know seed labeling for crops and weeds.
- For specific weeds, please see Addendum 2.

Turfgrass Diseases

- Identify common diseases.
- Know environmental and management conditions, and the types of diseases that the conditions favor.
- Know common fungicides.
- Know grass species corresponding to various diseases.
- Nematodes and various Abiotic stresses may be under Diseases
- For specific diseases and nematodes, please see Addendum 3.

Turfgrass Mathematics

- Calculate application rates of chemicals and fertilizers.
- Know quantities of sand and seed to use.
- Know how to correctly calibrate application equipment.

- Know how to use both the Metric and English units in calculations.

Turfgrass Insects

- Identify photos of larval and adult forms of insects that attack turf.
- Know life cycles, preferred foods, feeding methods and other characteristics important in controlling insects.
- For specific insects, please see Addendum 4.

Irrigation

- Know how to evaluate turfgrass water needs and adjust various irrigation methods and rates accordingly to ensure the efficiency and effectiveness of the irrigation system.
- Calculate water usage.
- Know the basics of using reclaimed water for irrigation.

Water Management

- Understand how turfgrasses process water, including transpiration.
- Understand water terminology
- Know the symptoms of water stress in various turfgrasses and how to remedy.
- Know the causes of pesticide and nutrient runoff and how to prevent.

Resources

The following resources, along with GCSAA's monthly publication *Golf Course Management* magazine, are recommended as study resources. The textbooks may be available through your school library, local bookstore or through the **GCSAA Store online** at <https://www.gcsaastore.com/> .

1. **The Mathematics of Turfgrass Maintenance (3rd Edition)** – Michael Agnew and Nick Christians
2. **Mathematics for the Green Industry: Essential Calculations for Horticulture and Landscaping Professionals** - Michael Agnew, Nancy Agnew, Ann Marie VanDerZanden and Nick Christians
3. **Turfgrass Management (Edition 1.0)** – A.J. Turgeon and J.E. Kaminski, <https://turfpath.com/book/>
4. **Fundamentals of Turfgrass Management (5th Edition)** – Nick Christians
5. **Turf Management for Golf Courses (2nd Edition)** – James B. Beard

6. **Salt-Affected Turfgrass Sites: Assessment and Management** – R.N. Carrow and R.R. Duncan
7. **Managing Turfgrass Pests (2nd Edition)** – Thomas L. Watschke, Peter H. Dernoden and David J. Shetlar
8. **Controlling Turfgrass Pests (3rd Edition)** – Thomas W. Fermanian, Malcom C. Shurtleff, Roscoe Randell, Henry T. Wilkinson and Philip L. Nixon
9. **Creeping Bentgrass Management: Summer Stresses, Weeds and Selected Maladies (2nd Edition)** – Peter H. Dernoden
10. **Human Resource Management for Golf Course Superintendents, ch. 6** – Bob Milligan and Tom Maloney
11. **Superintendents Handbook of Financial Management (Revised Edition), ch. 2, 3, 5, and 9** – Ray Schmidgall
12. **The Turf Problem Solver: Case Studies and Solutions for Environmental, Cultural and Pest Problems** – A.J. Turgeon and J.M. Jr. Vargas (Dec. 2, 2005)
13. **Identifying Turf and Weedy Grasses of the Northern United States** – D. Pedersen and T. Voight Illinois Pocket ID series University of Illinois Extension
<https://pubsplus.illinois.edu/collections/gardening/products/identifying-turf-weedy-grasses-of-northern-us>
14. **Turfgrass Insects of the United States and Canada (3rd Edition)** – Patricia J. Vittum
15. **Turfgrass Identification (vernation)**- David Gardner, The Ohio State University
buckeyeturf.osu.edu/pdf/01_turfgrass_identification.pdf
16. **Handbook of Turfgrass Insects (2nd Edition)** – Edited by Rick L. Brandenburg and Callie P. Freeman, 2012
17. **A Practical Guide to Turfgrass Fungicides (2nd Edition)** by Richard Latin, 2021
18. **Compendium of Turfgrass Diseases (4th Edition)** – Edited by Lane P. Tredway, Maria Tomaso-Peterson, James P. Kerns, and Bruce B. Clarke, 2023
19. Best Management Practices for Turfgrass Water Conservation
commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/1650_BMP_H2O.htm
20. Best Management Practices: Planning Guide & Template – GCSAA
https://www.gcsaa.org/docs/default-source/environment/bmp-planning-guide_2023_print_final.pdf?sfvrsn=f174c03e_1
21. Golf Course Environmental Profile eifg.org/research/golf-course-environmental-profile
22. **Golf Turf Management** – L.B. (Bert) McCarty, 2018

23. **Practical Golf Course Maintenance: The Art of Greenkeeping** (4th Edition) – Michael Bavier, CGCS Retired, and Luke Cella, CGCS
24. Nematode Management For Golf Courses In Florida – William T. Crow
<https://edis.ifas.ufl.edu/publication/IN124>
25. Guide for Interpreting Nematode Assay Results – University of Georgia Extension
<https://extension.uga.edu/publications/detail.html?number=C834&title=guide-for-interpreting-nematode-assay-results>
26. Key to the Most Common Genera of Plant-Parasitic Nematode (located at the end of the Turf Bowl Study Guide)

Addendum 1

Cool Season Grasses

Common name	Scientific name
1. Kentucky bluegrass	<i>Poa pratensis</i>
2. Perennial ryegrass	<i>Lolium perenne</i>
3. Tall fescue	<i>Festuca arundinacea</i> = <i>Schedonorus arundinaceus</i> = <i>Lolium arundinaceum</i>
4. Hard fescue	<i>Festuca brevipila</i> (<i>F. trachyphylla</i>)
5. Chewings fescue	<i>Festuca rubra</i> ssp. <i>commutata</i> (ssp. <i>fallax</i>)
6. Creeping bentgrass	<i>Agrostis stolonifera</i>
7. Colonial bentgrass	<i>Agrostis capillaris</i>
8. Strong creeping red fescue	<i>Festuca rubra</i> ssp. <i>rubra</i>
9. Slender creeping red fescue	<i>Festuca rubra</i> ssp. <i>littoralis</i>
10. Velvet bentgrass	<i>Agrostis canina</i>
11. Rough bluegrass	<i>Poa trivialis</i>
12. Annual bluegrass	<i>Poa annua</i>
13. Annual ryegrass	<i>Lolium multiflorum</i>

Warm Season grasses

14. Japanese / Korean lawngrass	<i>Zoysia japonica</i>
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15. Manilla grass	<i>Zoysia matrella</i>
16. Hybrid bermudagrass	<i>Cynodon dactylon</i> X <i>C. transvaalensis</i>
17. Common bermudagrass	<i>Cynodon dactylon</i> var. <i>dactylon</i>
18. Centipedegrass	<i>Eremechloa ophiuroides</i>
19. Seashore paspalum	<i>Paspalum vaginatum</i>
20. Buffalograss	<i>Bouteloua dactyloides</i>
21. St. Augustinegrass	<i>Stenotaphrum secundatum</i>
22. Kikuyugrass	<i>Pennisetum clandestinum</i>
23. Bahiagrass	<i>Paspalum notatum</i>
24. Carpetgrass	<i>Axonopus affinis</i>
24. Blue grama	<i>Bouteloua gracilis</i>
25. Sideoats grama	<i>Bouteloua curtipendula</i>

Addendum 2

Weeds

Alkaligrass	<i>Puccinella distans</i>
Barnyardgrass / Watergrass	<i>Echinochloa crus-galli</i>
Bedstraw / Catchweed	<i>Galium aparine</i>
Bindweed, Field	<i>Convolvulus arvensis</i>
Brassbuttons, Souther	<i>Cotula australis</i>
Buttonweed, Virginia	<i>Diodia virginia</i>
Carpetweed	<i>Mollugo verticillata</i>
Carrot, Wild	<i>Daucus carota</i>
Chess, Soft	<i>Bromus hordeaceus</i>
Chickweed, Common	<i>Stellaria media</i>
Chickweed, Mouseear	<i>Cerastium vulgatum</i>
Chicory	<i>Cichorium intybus</i>
Clover, White	<i>Trifolium repens</i>
Crabgrass, Hairy (Large)	<i>Digitaria sanguinalis</i>
Crabgrass, Smooth	<i>Digitaria ischaemum</i>
Cudweed, purple	<i>Gnaphalium purpureum</i>
Dallisgrass (smooth paspalum)	<i>Paspalum dilatatum</i>
Dandelion, False /spotted catsear	<i>Hypochoeris radicata</i>
Dandelion	<i>Taraxacum officinale</i>
Dichondra	<i>Dichondra repens</i>
Dock, Curly	<i>Rumex crispus</i>
Downy Brome / cheatgrass	<i>Bromus tectorum</i>
English Daisy	<i>Bellis perennis</i>

Foxtail, Yellow (pigeon / bristle grass)
Foxtail , Green
Garlic , Wild
Geranium, Carolina / dovefoot
Goosegrass/Silver Crab/ Crowfoot
Ground Ivy (Creeping Charlie/Jenny)
Hawkweed
Henbit
Johnsongrass
Khaki weed
Kikuyugrass
Knotweed, Prostrate / Common
Kochia
Kyllinga, Annual / Fragrant
Kyllinga, Green / Perennial
Lambsquarter
Lettuce, Prickly
Mallow, Common
Medic, Black
Medic, Burr/Burr Clover
Moss, silvery thread
Mullein, Common
Nimblewill
Nutsedge, Purple
Nutsedge, Yellow
Oats, Wild
Orchardgrass
Pearlwort
Pennywort / dollarweed
Peppergrass / pepperweed
Pigweed, Prostrate
Pineapple Weed / wild chamomile
Plantain, Broadleaf
Plantain, Buckhorn / Narrowleaf
Puncture Vine / goatshead
Purslane, common
Quackgrass
Rattail fescue
Redtop
Salsify, Western
Sandbur/ grassbur

Setaria glauca (pumilla ssp pumilla)
Setaria viridis
Allium vineale
Geranium ssp.
Elusine indica
Glechoma hederacea
Hieracium pratense
Lamium amplexicaule
Sorghum halapense
Alternanthera pungens
Pennisetum clandestinum
Polygonum aviculare
Kochia scoparia
Kyllinga odorata
Kyllinga brevifolia
Chenopodium album
Lactuca serriola
Malva neglecta
Medicago lupulina
Medicago polynorpha
Bryum argenteum
Verbascum thapsus
Muhlenbergia schreberi
Cyperus rotundus
Cyperus esculentus
Avena fatua
Dactylis glomerata
Sagina apetala (procumbens)
Hydrocotyle umbellate
Lepidium virginicum
Amaranthus blitoides
Matricaria discoidea
Plantago major
Plantago lanceolata
Tribulus terrestris
Portulaca oleracea
Elytrigia repens
Vulpia myuros
Agrostis gigantean (alba)
Tragopogon dubius
Cenchrus incertus

Sedge, Annual
Shepherd's Purse
Signalgrass
Smartweed, Spotted (Ladysthumb)
Smutgrass
Sorrell, Red / Sheeps
Speedwell, creeping
Spurge, Prostrate / Spotted
Star of Bethlehem
Strawberry, Wild
Swinecress
Timothy
Thistle, Bull
Thistle, Canada
Thistle, Musk
Torpedograss
Velvetgrass, German
Violet
Woodsorrel, Creeping
Woodsorrel, Yellow (Oxalis)
Yarrow
Yellowcress

Cyperus compressus
Capsella bursa-pastoris
Urochloa subquadriflora
Polygonum persicaria
Sporobolus indicus
Rumex acetosella
Veronica filiformis
Chamaesyce maculata (Euphorbia)
Ornithogalum umbellatum
Fragaria virginiana
Coronopus didymus
Phleum pratense
Cirsium vulgare
Cirsium arvense
Carduus nutans
Panicum repens
Holcus mollis
Viola ssp.
Oxalis corniculata
Oxalis stricta
Achillea millefolium
Rorippa palustris

Addendum 3

Bacterial Diseases

Bacterial wilt
Bacterial etiolation and decline

Xanthomonas translucens
Acidovorax avenae

Fungal Diseases

Anthraxnose
Ascochyta leaf blight
Bermudagrass decline
Blister smut
Brown patch (C3) & large patch (C4)
Brown ring patch
Brown stripe
Cladosporium eyespot
Copper spot
Coprinus snow mold
Crown rust
Curvularia blight
Dead spot

Colletotrichum cereale, C. eremochloae
Ascochyta avenae
See Root decline of warm-season grasses
Jamesdicksonia dactylidis
Rhizoctonia solani
Waitea circinata var. *circinata*
Mycosphaerella recutita
Cladosporium phlei
Gloeocercospora sorghi
Coprinopsis psychromorbida
Puccinia coronata
multiple *Curvularia* sp.
Ophiosphaerella agrostis

Dollar spot	<i>Clariireedia</i> is new genus <i>Clariireedia homeocarpa</i> on <i>Festuca rubra</i> , UK only <i>Clariireedia bennettii</i> on mostly cool season grasses, UK, Netherlands, USA <i>Clariireedia monteithiana</i> on Warm-season grasses; found worldwide <i>Clariireedia jacksonii</i> on cool-season grasses; found worldwide
Drechslera leaf spots and melting-out Endophytic fungi	multiple <i>Drechslera</i> and <i>Mariellottia</i> sp. <i>Neotyphodium coenophialum</i> , <i>N. lolii</i> , <i>Epichloe typhina</i>
Fairy ring	Species of Agaricales and Gastromycetales, mostly in the genera <i>Agaricus</i> , <i>Calvatia</i> , <i>Chlorophyllum</i> , <i>Clitocybe</i> , <i>Lepiota</i> , <i>Lycoperdon</i> , <i>Marasmius</i> , <i>Scleroderma</i> , and <i>Tricholoma</i> .
Flag smut	<i>Urocystis agropyri</i>
Gray leaf spot	<i>Pyricularia grisea</i>
Gray snow mold	<i>Typhula incarnata</i>
Leaf and sheath spot (Mini-ring)	<i>Waitea circinata</i> var. <i>zeae</i> , <i>W. circinata</i> var. <i>oryzae</i>
Leaf rust	<i>Puccinia brachypodii</i>
Leptosphaerulina leaf blight	<i>Leptosphaerulina trifolii</i>
Mastigosporium leaf spot (leaf fleck)	<i>Mastigosporium rubricosum</i>
Microdochium patch	<i>Microdochium nivale</i>
Necrotic ring spot	<i>Ophiosphaerella korrae</i>
Phyllosticta leaf blight	Multiple species of <i>Phyllosticta</i> and <i>Guignardia</i>
Physoderma leaf spot and leaf streak	<i>Physoderma graminis</i>
Pink patch and cream leaf blight	<i>Limonomyces roseipellis</i>
Pink snow mold	See Microdochium patch
Powdery mildew	<i>Blumeria graminis</i>
Pythium foliar blight	<i>Pythium aphanidermatum</i> , <i>P. graminicola</i> , <i>P. ultimum</i> , Several other <i>Pythium</i> species
Pythium root and crown rot	<i>Pythium aristosporum</i> , <i>P. arrhenomanes</i> , <i>Pythium volutum</i> , several other <i>Pythium</i> species
Pythium root dysfunction:	<i>Pythium volutum</i> , <i>P. arrhenomanes</i> , <i>P. aristosporum</i> , several other <i>Pythium</i> species
Rapid blight	<i>Labyrinthula terrestris</i>
Red thread	<i>Laetisaria fuciformis</i>
Root decline of warm-season grasses	<i>Gaeumannomyces graminis</i> var. <i>graminis</i> , <i>Magnaporthiopsis incrustans</i> , <i>G. wongoonoo</i>
Septoria leaf spot	several <i>Septoria</i> species
Snow scald	<i>Sclerotinia borealis</i>

Southern blight	<i>Athelia rolfsii</i>
Speckled snow mold	<i>Typhula ishikariensis</i>
Spring dead spot	<i>Ophiosphaerella narmari, O. korrae,</i> <i>O. herpotricha</i>
Stem rust	<i>Puccinia graminis</i>
Stripe rust	<i>Puccinia striiformis</i>
Stripe smut	<i>Ustilago striiformis</i>
Summer patch	<i>Magnaporthiopsis poae</i>
Take-all patch	<i>Gaeumannomyces graminis</i>
Tar spot	<i>Phyllachora</i> spp.
Thatch collapse	<i>Sphaerobolus stellatus</i>
Yellow patch	<i>Rhizoctonia cerealis</i>
Yellow tuft	<i>Sclerophthora macrospora</i> .
Yellow ring	<i>Trechispora alnicola</i>

Nematodes, Parasitic

Awl: *Dolichodorus* spp. Cobb
 Cyst: *Heterodera* spp. Schmidt
 Dagger: *Xiphinema* spp. Cobb
 Lance: *Hoplolaimus* spp. Daday
 Lesion: *Pratylenchus* spp. Filipjev
 Needle: *Longidorus* spp. (Micoletzky) Thorne & Swanger
 Pin: *Paratylenchus* spp.
 Pseudo-root knot: *Hypsoperine* spp. Sledge & Golden
 Ring: *Criconemella*, *Criconemoides*, *Macroposthonia*, and *Mesocriconema* spp.
 Root gall: *Subanguina* spp.
 Root knot: *Meloidogyne* spp. Goeldi
 Sheath: *Hemicycliophora* spp.
 Sheathoid: *Hemicriconemoides* spp.
 Spiral: *Helicotylenchus* spp. Steiner
 Sting: *Belonolaimus* spp. Steiner
 Stubby root: *Paratrichodorus* and *Trichodorus* spp.

Stylet or stunt: *Tylenchorhynchus* spp. Cobb

Miscellaneous Diseases or Disorders

Black Layer: A

Anaerobic soil plus blue-green algae and/or sulfate-reducing bacteria

Slime Molds (superficial, not pathogenic):

Mucilago crustacea

: *Didymium squamulosum*

: *Physarum cinereum*.

: Species of *Physarum* and *Fuligo*

Addendum 4:

Insects

Annual Bluegrass Weevil

Billbugs

- bluegrass billbug
- hunting billbug
- Denver/Rocky Mountain billbug
- Phoenix billbug

Black Turfgrass Ataenius

Flea Beetle

Chinchbugs

- hairy chinchbug
- southern chinchbug

Craneflies

- European crane fly (*Tipula paludosa*)
- "common" crane fly (*Tipula oleraceae*)

Caterpillars and adults

- armyworm
- black cutworm
- fall armyworm
- winter cutworm
- sod webworm

Mole Crickets

- southern mole cricket
- northern mole cricket
- tawny mole cricket

Ant

- red imported fire ant
- turfgrass ant
- formica ant

White Grubs and Adult Beetles

- Asiatic garden beetle

- European chafer
- Japanese beetle
- masked chafer (southern)
- masked chafer (northern)
- masked chafer (western)
- masked chafer (southwestern)
- sugarcane beetle
- Green June beetle
- May/June beetle
- Oriental beetle

Mites

- Stunt (Bermuda)
- Banks grass

Wasps

- Scoliid
- Cicada Killers
- yellow jacket
- Paper wasp

Two-lined spittlebug

Rhodesgrass Mealybug

Groundpearl (pearl scales)

Wireworm

Beneficials

Honey bees

Assassin bugs

Ground beetle

Lacewing

Praying Mantis

Rove beetles

Big Eyed bug