



INSTRUCTIONAL PACKAGE

TUF 272

Turf Irrigation and Drainage

Effective Term

Fall 2023/Spring 2024/Summer 2024

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Part I: Course Information

Effective Term: Fall 2023/Spring 2024/Summer 2024

COURSE PREFIX: TUF 272

COURSE TITLE: Turf Irrigation and Drainage

CONTACT HOURS: 7.0

CREDIT HOURS: 5.0

RATIONALE FOR THE COURSE:

This course introduces the student to golf course and sports turf irrigation and drainage systems, their components, operation, and management. It will give them the necessary skills to operate an irrigation system and perform basic troubleshooting and repairs to that system which is one of the most important agronomic tools used by turf managers.

COURSE DESCRIPTION:

This course is a study of the principles and practices of irrigation design, installation, and maintenance as it applies to golf courses. Practical application is included.

PREREQUISITES/CO-REQUISITES:

None

***Online/Hybrid** courses require students to complete the [DLi Orientation Video](#) prior to enrolling in an online course.

REQUIRED MATERIALS:

Please visit the [BOOKSTORE](#) online site for most current textbook information.

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

ADDITIONAL REQUIREMENTS:

None

TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's learning management system (LMS) used for course materials.

Access to myHGTC portal for student self-services.

College email access – this is the college's primary official form of communication.

STUDENT IDENTIFICATION VERIFICATION:

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual event to support student identification verification. Please refer to your Instructor Information Sheet for information regarding this requirement.

CLASSROOM ETIQUETTE:

As a matter of courtesy to other students and your professor, please turn off cell phones and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate. No vaping in class.

NETIQUETTE: is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat focused on online communications etiquette. For more information regarding Netiquette expectations for distance learning courses, please visit [Online Netiquette](#).

Part II: Student Learning Outcomes

COURSE LEARNING OUTCOMES and ASSESSMENTS*:

Unit I: Plant Irrigation Requirements and Water Supply: Quantity and Quality

1. List six possible sources of irrigation water for golf courses and some advantages and disadvantages of each source.
2. Identify the different methods of expressing soil and water saline levels and general guidelines for turf growth and development.
3. Calculate the volume of water in ponds and lakes given hypothetical shapes and dimensions.
4. Develop management strategies for dealing with less than desirable water quality levels used for golf course irrigation.
5. Understand permits and water rights in relation to irrigation.

Unit II: Pumping Systems for Irrigation

1. List three types of golf course pumping systems and give advantages and disadvantages of each.
2. Explain the difference between end-suction centrifugal, vertical turbine, and flooded suction methods of supplying water to the intake of a golf course pumping system.
3. Describe how a Clayton valve operates and how its opening and closing is controlled.
4. Define the major components of a VFD controlled pumping system such as CPU, pressure transducer, phase inverter, and PLC.

Unit III: Irrigation System Components

1. Evaluate and select the appropriate sprinkler for a given turf application.
2. Properly space irrigation heads to scale on the green, tee, and fairway of a hypothetical golf hole.
3. Define the terms desired effective coverage, percent head spacing, and wetted diameter.

4. Understand all the components of an irrigation system including pipe, fittings, valves, sprinklers, quick coupling valves, swing joints control systems, wire and lightning protection.
5. Define terms such as SDR, Class Pipe, Pressure Rated Pipe, C Factor, and Velocity as they relate to water movement in irrigation piping.
6. Label the parts of a typical golf course remote control valve.
7. Describe to opening and closing mechanism of an electrical and hydraulic remote control valve.
8. Program the proper information into a computer program for an example three hole golf course.
9. List the various types of golf course irrigation controllers and describe the advantages and disadvantages of each.
10. List the components of an automatic irrigation system.

Unit IV: Irrigation Design, Construction, and Installation

1. Perform mathematical computations relating to elevation changes, friction loss in piping, working and static pressures.
2. Properly size pipe and make accurate loop calculations given realistic examples based on GPM flows and expected PSI at sprinkler base of head.
3. Understand the critical path to and irrigation installation.

Unit V: Irrigation System Maintenance

1. Understand the basics of preventative and curative maintenance.
2. Identify and correct problems with troubleshooting techniques.
3. Define the terms open, short, partial short, volts, amps, current, and ohms or resistance.
4. Use a volt-ohm meter to troubleshoot a 24-volt electric irrigation circuit.
5. Draw and label the proper method of grounding an irrigation field satellite.

Unit VI: Irrigation System Operation

1. Programming Central Control System
2. Understanding watering windows and irrigation scheduling.
3. Identify the balance between playability and presentability
4. Compute the precipitation rate (PR) of a specific model and type of sprinkler given the base of head pressure, nozzle size, radius of throw, and layout configuration.
5. Solve problems dealing with sprinkler run times to produce desired depths of precipitation over turf areas.
6. List the variables that affect irrigation scheduling as it relates to daily E.T. values.
7. Define the terms design depth, available moisture content, irrigation interval, and design run time.

Unit VII: Drainage Basics

1. Understand the impacts of soil structure, soil particle size and dispersion on drainage systems.
2. Identify the differences and uses of surface and internal drainage systems.

3. Define terms used in soil drainage, i.e. field capacity, gravitational water, saturation, infiltration, and water storage.
4. Understand gravity and it's impact on water movement.
5. Understand capillary and lateral movement of water in soils
6. Effectively use drainage equipment in the field such as transits, laser leveling and phily rods.

Unit VIII: Drainage Systems for Golf Courses, Athletic Fields and other Turfgrass Areas

1. Detail and understand the perched water table systems of the USGA and California Greens Construction Methods.
2. Design and install a subsoil drainage system
3. Identify uses for slit and surface drainage when subsoil drainage is not an option.

Module # 2

Materials Covered: Pump Systems

***Assessment(s):** Complete in lab assignment.
Identification Format.

Learning Outcomes:

1. Identify the difference between end-suction centrifugal, vertical turbine, and flooded suction methods.
2. List three types of pumping systems
3. Describe how a Clayton valve operates.

Module #4

Materials Covered: Pipe Sizing

***Assessment(s):** Lab activity

Learning Outcomes:

1. Describe why pipe sizing is needed in irrigation.
2. Calculate pipe size given demand.
3. Calculate psi based on elevation change.
4. Define terms such as SDR, Class Pipe, Pressure Rated Pipe

REQUIRED COURSE MEASURES/ARTIFACTS

- Tests and Quizzes
- Assignments

- Projects
- Group projects
- Presentations

****Students – please refer to the Instructor’s Course Information sheet for specific information on assessments and due dates.***

Part III: Grading and Assessment

EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS*:

Students’ performance will be assessed and the weight associated with the various measures/artifacts are listed below.

EVALUATION*

Tests/Quizzes	30%
Assignments/Projects/Presentations	30%
Class Participation	30%
Final Exam	10%
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	100%

****Students, for the specific number and type of evaluations, please refer to the Instructor’s Course Information Sheet.***

GRADING SYSTEM:

State the College’s or departmental grading system as delineated in the Catalog. Please note the College adheres to a 10 point grading scale A = 100 – 90, B = 89- 80, C = 79 – 70, D = 69 – 60, F = 59 and below. You must have your Dean’s approval if changes in the scale are made.

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of that course of action. Ds, Fs, Ws, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the [academic calendar](#) for deadlines for add/drop. You must attend at least one meeting of all of your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly.

Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes in order to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a

student has missed over 20% of the course or has missed two (2) consecutive weeks, the faculty is obligated to withdraw the student and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

For online and hybrid courses, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

Part V: Student Resources



THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers to all students the following **free** resources:

1. **Academic tutors** for most subject areas, **Writing Center support**, and **college success skills**.
2. Online **tutoring** and academic support resources.
3. Professional and interpersonal communication **coaching** in the EPIC Labs.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at sstc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email sstc@hgtc.edu or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the [Online Resource Center](#) to access on-demand resources.



STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following **free** resources:

1. **Getting around HGTC:** General information and guidance for enrollment, financial aid, registration, and payment plan support!
2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **Chat with our staff on TECH Talk**, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552.

Visit the [Tech Central](#) website for more information. Live Chat and Center locations are posted on the website. Or please call (843) 349 – TECH (8324), Option #1.



HGTC LIBRARY:

Each campus location has a library where HGTC students, faculty, and staff may check out materials with their HGTC ID. All three HGTC campus libraries are equipped with computers to support academic research and related school work; printing is available as well. Visit the [Library](#) website for more information or call (843) 349-5268.

STUDENT TESTING:

Testing in an **online/hybrid** course and in **make-up exam** situations may be accomplished in a variety of ways:

- Test administered within D2L
- Test administered in writing on paper
- Test administered through Publisher Platforms (which may have a fee associated with the usage)

Furthermore, tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

The **Instructor Information Sheet** will have more details on test requirements for your course.

DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability staff will review documentation of the student's disability and, in a confidential setting with the student, develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided.

STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:

Horry-Georgetown Technical College prohibits discrimination and harassment, including sexual harassment and abuse, on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or

pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation in educational programs and/or activities.

TITLE IX REQUIREMENTS:

All students (as well as other persons) at Horry-Georgetown Technical College are protected by Title IX—regardless of their sex, sexual orientation, gender identity, part- or full-time status, disability, race, or national origin—in all aspects of educational programs and activities. Any student, or other member of the college community, who believes that he/she is or has been a victim of sexual harassment or sexual violence may file a report with the college’s Chief Student Services Officer, campus law enforcement, or with the college’s Title IX Coordinator or designee.

*Faculty and Staff are required to report incidents to the Title IX Coordinators when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:

Student and prospective student inquiries concerning Section 504, Title II, Title VII, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs.

Dr. Melissa Batten, VP Student Affairs

Title IX, Section 504, and Title II Coordinator
 Building 1100, Room 107A, Conway Campus
 PO Box 261966, Conway, SC 29528-6066
 843-349-5228

Melissa.Batten@hgtc.edu

Employee and applicant inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources.

Jacquelyne Snyder, VP Human Resources

Affirmative Action/Equal Opportunity Officer and Title IX Coordinator
 Building 200, Room 205B, Conway Campus
 PO Box 261966, Conway, SC 29528-6066
 843-349-5212

Jacquelyne.Snyder@hgtc.edu