GISCI GEOSPATIAL CORE TECHNICAL KNOWLEDGE EXAM ®
CANDIDATE MANUAL

January 2019

This document provides information about the GISCI Geospatial Core Technical Knowledge Exam ®, now a requirement for GISCI GISP Certification. For information about the GISP Certification Program, consult the GISCI website at www.gisci.org.

This document is updated prior to each exam window.

Next Exam: **Summer 2019**

Exam Date: June 1-8, 2019 (Worldwide)

Application Period: North American locations: until two weeks prior to first exam date
                      International locations: until four weeks prior to first exam date

Future Exams: Currently, exams are scheduled twice a year, in the Summer (June) and Fall (December)

Exam Procedure

Submit Application. Apply online at the GISCI website (www.gisci.org).

Pay Application and Exam Fees. Once your Application Form is received you will be contacted with instructions for payment.
- **Application Fee.** The Exam Application Fee is $100. If you have previously paid the Application Fee for a Portfolio Review, you will not be charged a second time.
- **Exam Fee.**
  - US and Canada: $250
  - International: $300

Schedule your specific exam date. You will receive email authorization to schedule your exam. Once you receive this email notice, contact the test provider to schedule your specific exam date, time, and location. The exam will be offered at specific times at test facilities across the US. Exam times and seat capacity will vary among test facilities, so, to ensure obtaining the most convenient location and time, you are encouraged to schedule your exam as soon as possible after you receive authorization.

Take the Exam. You must take the exam at the place and time arranged between you and the test provider (PSIOnline).

Receive Exam Results. You can expect preliminary exam results after you complete the exam at the PSI facility. GISCI will review the exam scoring and send a final exam notification within two to fours weeks of the exam close.

Extensions to the Procedure

- **Rescheduling.** You may contact PSI to reschedule your specific exam date at least 2 days prior to the exam date, without financial penalty, if there is space available.
- **Inability to schedule your specific exam date.** If you are authorized to take the exam, but do not schedule your specific exam date, you may receive a refund or transfer the Exam Fee to the next exam period, upon request. (Contact the GISCI Executive Director.)
- **Postponement to a later exam event.** If you wish to take the exam at a later exam event, you must obtain authorization for that exam event. Your Exam Fee may be transferred to that event.
- **Failure to take your exam as scheduled.** If you schedule your exam and do not take it, the Exam Fee may not be refunded without prior notice. If you want to take the exam at a later event, you must obtain authorization for that date, and pay the Exam Fee for that date.
- **Exam failure and retake.**
  - If you fail the exam, you may take it again at the next exam event. You must obtain authorization for that future event.
  - If you fail the exam, you must pay the Exam Fee to take it again, and must obtain authorization for the exam event in which you plan to take it.
  - If you fail the exam twice, in back to back sessions, you must wait a year before re-testing.
  - You may not retake the exam in the same exam event.
- **Next exam.** The GISCI Geospatial Core Technical Knowledge Exam ® is scheduled with a current interval of approximately 6 months, with exam events scheduled in the Summer and Fall of each year. (Check the GISCI website www.gisci.org for future exam dates.)

Exam Location & Scheduling

- The exam will be offered through PSIOnline's testing centers worldwide.
- North American locations: Once you receive your authorization, you may contact PSI to schedule your exam date, time
  International locations: You may need to schedule your exam date & time by direct request to GISCI

Exam Description

- **Length.** Each exam willl have between 175-195 questions. 100 of the questions are scored. (Future exams will have approximately 175-195 questions, with 100 scored.)
- **Time.** The time allowed for the exam is 4 hours. We try to accomodate special needs.
- **Format:** The questions are Selected Response format.
- **Medium.** The exam will be offered via Computer Based Testing on the computers at the testing centers. Calculators will be provided, as necessary, on the testing center's computers.
- **Environment.** The exam will be proctored.
- **Language.** English.

Scoring

The exam contains two types of questions: multiple choice and multiple response. Approximately ¾ of the exam questions are multiple choice. For these questions, select the one best answer from the list of options. The rest are multiple response. Each multiple response question ends with "Select all that apply." For these questions, select all of the correct answers from the list of options. There are at least two correct answers for each multiple response question.

Each question is scored as correct or incorrect, and all items have the same weight. Items with no response are scored as incorrect. Multiple response items must have all correct responses to be scored correct. Otherwise, they are scored as incorrect. The number of correct answers is totaled to determine the candidate's exam score. A score of 75% correct answers for the 100 scored questions is needed to pass.

Exam Content

Exam Foundation

The exam is based on a job analysis involving GIS professionals across all GIS job categories and sectors, with at least four years of GIS experience. It is also guided by the Geospatial Technology Competency Model, Tier 4, Core Geospatial Industry-Wide Technical Competencies, and informed by the Geographic Information Science & Technology Body of Knowledge.

Core GIS Technical Knowledge

The exam tests core geospatial technical knowledge. Therefore, it does not address software details, specific environments, specialized knowledge, ethics, or management knowledge.

Exam Knowledge Areas

The exam covers 44 specific Knowledge Areas grouped into six Categories as indicated in the tables below.

GISCI Geospatial Core Technical Knowledge Exam ® Knowledge Categories

Knowledge Category	Weight
1. Conceptual Foundations	12%
2. Cartography and Visualization	14%
3. GIS Design Aspects and Data Modeling	29%
4. GIS Analytical Methods	17%
5. Data Manipulation	15%
6. Geospatial Data	13%
Total	*100%*

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GISCI Geospatial Core Technical Knowledge Exam ® Knowledge Areas

1. Conceptual Foundations

101. Knowledge of spatial relationships such as distance (e.g., horizontal and vertical), direction, and topology (e.g., adjacency, connectivity, and overlap) that are particularly relevant to geospatial data analysis

102. Knowledge of standard spatial data models, including the nature of vector, raster, and object-oriented models, in the context of spatial data used in the workplace

103. Understanding of the conceptual foundations on which geographic information systems (GIS) are based, including the problem of representing change over time and the imprecision and uncertainty that characterizes all geographic information

104. Knowledge of earth geometry and its approximations, including geoids, ellipsoids, and spheres

105. Knowledge of georeferencing systems, including coordinate systems, spatial projections, and horizontal and vertical datums

2. Cartography and Visualization

206. Knowledge of contour mapping

207. Knowledge of basic physical geography (e.g., types of boundaries, continents, landforms, and topography)

208. Understanding of how data collection methods influence map design and representation

209. Knowledge of graphic representation techniques, including thematic mapping, multivariate displays, and web mapping

210. Knowledge of principles of map design, including symbolization, color use, and typography, for a variety of print and digital formats

211. Understanding of how the selection of data classification and/or symbolization techniques affects the message of the thematic map

3. GIS Design Aspects and Data Modeling

312. Knowledge of data exchange procedures

313. Knowledge of security restrictions on data (e.g., user permissions and access rights)

314. Knowledge of database administration

315. Knowledge of systems architecture and design

316. Understanding of the enterprise environment

317. Knowledge of schemas and domains and how they interact

318. Knowledge of digital file management

319. Knowledge of database design

320. Knowledge of database general structure (e.g., tables and data)

321. Knowledge of geospatial data structure (e.g., topology rules)

322. Understanding of desktop, server, enterprise, and hosted (e.g., cloud) applications available, including their benefits and shortcomings

323. Working knowledge of GIS hardware and software capabilities (e.g., application servers, data servers, storage devices, and workstations)

324. Knowledge of data models, including vector, raster, grid, TIN, topological, hierarchical, network, and object-oriented

4. GIS Analytical Methods

425. Knowledge of overlay analysis

426. Functional knowledge of planar geometry (e.g., points, lines, and polygons) required to convert real world examples into spatial concepts

427. Knowledge of algebra (e.g., deriving values from a basic formula)

428. Knowledge of statistics (e.g., descriptives, summary statistics, and R-squared)

429. Knowledge of basic programming (e.g., scripting, object oriented, query, and extensible)

430. Knowledge of raster/vector principles

431. Knowledge of scales (e.g., visual, verbal, relative, absolute, physical, and display vs. data)

432. Knowledge of units of measurement (e.g., conversion and angular vs. metric)

5. Data Manipulation

533. Knowledge of selection queries (e.g., attribute, spatial, and location)

534. Knowledge of different data types (e.g., SHP, GDB, Coverage, DGN, TXT, and IMG) and formats (spatial, rendered, and tabular)

535. Knowledge of different field types

536. Knowledge of data relationships (e.g., one to one and many to many)

537. Knowledge of data collection, transfer, and format conversion (e.g., export formats, properties, and settings)

538. Knowledge of data quality, including geometric accuracy, thematic accuracy, resolution, precision, and fitness for use

6. Geospatial Data

639. Knowledge of metadata and its standards (e.g., ISO and FGDC)

640. Understanding of the difference between quality control and quality assurance in the context of a given geospatial project

641. Knowledge of data archiving and retrieval

642. Knowledge of the differences among a join, a merge, a union, a clip, and an intersect

643. Knowledge of basic geomatics

644. Knowledge of basic field data collection

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Sample Questions

The following sample questions provide examples of the question format.   An answer key is provided at the end of the list of questions.

1) Which is an example of analog-to-digital conversion?
   a) Creating centroids from a polygon file
   b) Importing a DXF
   c) Scanning a map document to JPG format
   d) Transforming a GIF to a TIF

2) Which of the following is NOT a component of the OGC geometry object model?
   a) Chain
   b) Curve
   c) Point
   d) Surface

3) Which is the most effective method for maintaining data quality to ensure that no line features of a stream center line layer intersect the polygon feature of a land cover layer?
   a) Clip
   b) Intersect
   c) Overlay
   d) Topology

4) According to National Map Accuracy Standards, what percentage of features must be within 1/30 of an inch or less from their intended horizontal accuracy on maps with scales of 1:20,000 or larger?
   a) 5%
   b) 10%
   c) 90%
   d) 95%

5) Which are compression techniques for raster data? Select all that apply.
   a) Lattice
   b) Pyramids
   c) Quad trees
   d) Run length encoding

(ANSWER KEY: 1=c; 2=a; 3=d; 4=c; 5=c,d)

Study Resources

Resources that contain information related to the exam content are readily available in many forms. The following are examples of the types of materials that provide information regarding exam topics:

- GIS text books
- GIS compendiums and manuals (not software manuals)
- GIS courses
- GIS periodicals
- Cartography text books
- Cartography courses
- Geography text books
- Geography courses
- Mathematics and statistics text books
- Mathematics and statistics courses
- GIS software supplier general GIS discussion (not software specific)
- General computer and programming texts
- General computer and programming courses

Any of the specific items in the above categories would provide relevant information. Therefore, GISCI does not provide specific titles and citations.

The exam assesses geospatial professional competence acquired over the course of an individual's geospatial education, career, and mastery of the material.   It is expected that, for most candidates, study will involve refreshing their familiarity with some aspects of core geospatial knowledge that they may not have applied recently.

Exam Preparation Materials

A Practice Exam, an Unofficial GISCI Exam Study Guide, and other materials can be found on the GISCI website (https://www.gisci.org/ExamInfo/ExamCandidateInformation/ExamPreparationInfo.aspx).

On the Day of the Exam

- Arrive at the testing center **30 minutes** in advance.
- Present a valid, government-recognized, unexpired, photo **ID** with your name as it appears on your exam authorization and scheduling. (Contact GISCI at least two weeks in advance if you need to make arrangements for another type of ID to be used, and bring that pre-approved ID to the test center.)
- **No personal items** are to be brought into the testing area.
- **No electronic devices** of any kind are allowed in the testing area.
- You are **not permitted to leave the building or use your cell phone or other electronic devices** during the exam.
- There is to be **no conversing** or other form of communication among candidates once you enter the testing area.

- **Persons not scheduled to take the exam are not permitted** to wait in the testing center or surrounding common area.
- Test takers must conduct themselves in a **professional and courteous** manner at all times.
- You are **prohibited from reproducing, communicating or transmitting any test content** in any form for any purpose. Any such actions are violations of PSI and GISCI security policy, and may result in the disqualification of exam results and/or lead to legal action.

Special Accommodations

All exam centers are equipped to provide access in accordance with the Americans with Disabilities Act (ADA) of 1990, and every reasonable accommodation will be made in meeting a candidate's needs. If you have special requirements, please contact GISCI at least 30 days before the exam date, so that suitable arrangements can be made.

Non-Discrimination

GISCI does not discriminate on the basis of race, religion, sex, age, sexual orientation, or national origin, or any other category that is protected by federal law or applicable laws and regulations.

Appeal of Results

Any appeals regarding exam results should be submitted to the GISCI Executive Director.