



Fundamentals of Surveying (FS) FS CBT Exam Specifications

Effective Beginning with the July 2020 Examinations

- The FS exam is a computer-based test (CBT). It is closed book with an electronic reference.
- Examinees have 6 hours to complete the exam, which contains 110 questions. The 6-hour time also includes a tutorial and an optional scheduled break.
- The FS exam uses both the International System of Units (SI) and the U.S. Customary System (USCS).

Knowledge	Number of Questions
1. Surveying Processes and Methods	16–24
A. Instrumentation (e.g., GNSS/GPS, levels, total stations, robotic total stations, scanners, UAS)	
B. GNSS/GPS surveys (e.g., static, kinematic, OPUS, real-time networks)	
C. Control surveys (e.g., horizontal, vertical, network design, accuracy standards)	
D. Cadastral (e.g., Public Land Survey System [PLSS], boundary, metes and bounds, land title)	
E. Topographic surveys	
F. Construction surveys (e.g., layout, as-built, quantity)	
G. Land development (e.g., subdivision design/platting, land use, environmental, flood plains, wetlands)	
H. Field record keeping and documentation (e.g., procedures, field books, raw data files)	
2. Mapping Processes and Methods	14–21
A. Basic mapping concepts (e.g., scaling, symbols, features, legend, contours, cartography)	
B. Types of maps (e.g., plan and profile, cross section, plat, record of survey, ALTA, topographic, planimetric)	
C. CAD (e.g., 2-D, 3-D, building information modeling [BIM])	
D. GIS (e.g., feature collection, map projections, coordinate systems, metadata, database design and management, spatial data analysis, GIS applications)	
E. Digital terrain model (e.g., machine control, triangulated irregular network [TIN], digital surface model, digital elevation model)	
F. Photogrammetry and remote sensing (e.g., close range, conventional, softcopy, ground control, quality control, flight planning, project planning, UAS, drone, LiDAR, satellite, digital image analysis and processing)	

- 3. Boundary Law and Real Property Principles** **19–29**
- A. Public records and descriptions (e.g., land descriptions, mineral rights, ownership rights, weighting evidence)
 - B. Common law principles (e.g., controlling elements, unwritten rights, adverse possession)
 - C. Easements (e.g., granted, implied/prescriptive)
 - D. Simultaneous and sequential conveyances
 - E. Metes and bounds
 - F. PLSS
 - G. Water law (e.g., riparian, littoral rights, water marks/levels)
 - H. Sources of law (e.g., federal/state/local, administrative, common, citations, legal research)
 - I. Encumbrances (e.g., restrictive covenants, mortgages, liens)
 - J. Real property law (e.g., deeds, chains of title)
- 4. Surveying Principles** **13–20**
- A. Basic surveying (e.g., horizontal surveys, vertical surveys, understanding of historical methods and instruments, route surveying, magnetic declination)
 - B. Geodesy (e.g., spherical trigonometry, geometric, physical, geodetic coordinates, orthometric corrections, convergence, geodetic reductions, gravity modeling, geoid modeling)
 - C. Applied geodesy (e.g., datums and datum conversions, latitude/longitude, coordinate transformations, state plane coordinate system [SPCS], map projections, control networks, reduction of observations, deflection of vertical, satellite coordinate systems)
- 5. Survey Computations and Computer Applications** **17–26**
- A. Coordinate geometry
 - B. Traverse closure and adjustments
 - C. Leveling (e.g., differential, trigonometric, reciprocal, precise)
 - D. Least squares adjustments
 - E. Area
 - F. Horizontal curves
 - G. Vertical curves
 - H. Volume (e.g., mass diagrams, earthwork)
 - I. Spreadsheets
 - J. Slopes and grades
- 6. Business Concepts** **11–17**
- A. Project planning (e.g., resource management, scheduling, cost estimation, tracking)
 - B. Safety (e.g., signage, basic first aid, safety equipment)
 - C. Liabilities (e.g., negligence, employee behavior, errors and omissions)
 - D. Contracts (e.g., basic elements, scope of work, specifications)
 - E. Supervision (e.g., survey team leadership, personnel management)
 - F. Project documentation and record management

- G. Ethics
- H. Communication (e.g., written communication, oral communication, alternate forms of communication, conflict resolution)

7. Applied Mathematics and Statistics

10–15

- A. College mathematics (e.g., trigonometry, analytical geometry and calculus, linear algebra and matrix theory)
- B. Probability and statistics (e.g., mean, median, mode, hypothesis testing, normal distribution, linear regression)
- C. Measurement science (e.g., error analysis, error propagation, positional tolerance, positional accuracy, random/systematic/blunder errors, unit conversions)
- D. Quantitative reasoning (e.g., critical thinking, data analysis and validation, blunder detection, data quality, redundancy)