NCEES
advancing licensure for engineers and surveyors

NCEES Fundamentals of Surveying (FS) 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).

		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)

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Fundamentals of Surveying (FS) Standards

Effective Beginning with the July 2027 Examinations

Revisions from July 2020 standards list are shown in red.

In addition to the NCEES *FS Reference Handbook*, the following standards will be supplied in the exam as searchable, electronic pdf files with links for easy navigation. This NCEES YouTube video shows how standards will be presented on the exam. Standards will be provided as individual documents on the exam, and only one document at a time can be opened and searched. This ensures the exam software runs large files effectively. The handbook and standards will be available the entire exam.

Solutions to exam questions that reference a standard of practice are scored based on this list and the revision year shown. Solutions based on other standards will not receive credit.

NCEES does not sell standards or printed copies of the NCEES handbook. The NCEES handbook is accessible from your MyNCEES account.

ABBREVIATION	STANDARD TITLE
ALTA	*Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys,* 2026, American Land Title Association®, Washington, DC, and National Society of Professional Surveyors, Frederick, MD, www.nsps.us.com.
FEMA	*FEMA Elevation Certificate and Instructions*, 2023, Federal Emergency Management Agency, Hyattsville, MD, www.fema.gov.
FGCS	Section 3.5 Geodetic Leveling in *FGCS Specifications and Procedures to Incorporate Electronic Digital/Bar-Code Leveling Systems*, 2004, Federal Geographic Data Committee, Reston, VA, www.fgdc.gov.
GPAS	*Geospatial Positioning Accuracy Standards*, Federal Geographic Data Committee, Reston, VA, www.fgdc.gov. • Parts 1–3, 1998 • Part 4, 2002 • Part 5, 2005
NSPS Model	*NSPS Model Standards,* Sections A–H, 2002, National Society of Professional Surveyors, Frederick, MD, www.nsps.us.com.
USNMAS	*United States National Map Accuracy Standards*, 1947, U.S. Bureau of the Budget, Washington, DC, www.usgs.gov.