

SPECIALIST IN CYTOMETRY, SCYM(ASCP) INTERNATIONAL SPECIALIST IN CYTOMETRY, SCYM(ASCP)ⁱ

EXAMINATION CONTENT GUIDELINE

EXAMINATION MODEL

The SCYM(ASCP) and SCYM(ASCP)ⁱ certification examination is composed of 100 questions given in a 2 hour 30 minute time frame. All exam questions are multiple-choice with one best answer. The certification exam is administered using the format of computer adaptive testing (CAT).

With CAT, when a person answers a question correctly, the next test question has a slightly higher level of difficulty. The difficulty level of the questions presented to the examinee continues to increase until a question is answered incorrectly. Then a slightly easier question is presented. In this way, the test is tailored to the individual's ability level.

Each question in the test bank is calibrated for level of difficulty and is classified by content area. The content area aligns with the examination specific content outline. The examinee must answer enough questions correctly to achieve a measure above the pass point in order to successfully pass the certification examination. There is no set number of questions one must answer to pass, nor is there a set percentage one must achieve to pass. If at the end of the exam the examinee's score is above the pass point, then he or she passes the exam.

EXAMINATION CONTENT AREAS

The SCYM exam questions encompass the following content areas within Cytometry: Instrumentation, Panel/Experiment Design, Applications, Data, and Laboratory Operations. Each of these content areas comprises a specific percentage of the overall 100-question exam. The content areas and percentages are described below:

CONTENT AREAS	DESCRIPTION	EXAM PERCENTAGES
INSTRUMENTATION	Principles of fluidic, optical, and electronic instrumentation	15 – 20%
PANEL/EXPERIMENT DESIGN	Sample Source, Sample Integrity, Sample Preparation and Staining, Target, Sample State, Probe Types, Fluorochrome Selection, Spectral Overlap and Compensation, Assay Controls, and Assay Optimization	25 – 30%
APPLICATIONS	Immunophenotyping, Functional Assays, Multiplex Bead Assays, Solid Organ Transplant, Stem Cell Analysis, Cell Cycle/DNA Ploidy, Rare Event Analysis, Microparticle Analysis, Fetal Hemoglobin Assay, Cell Sorting, and Imaging Cytometry	25 – 30%
DATA	Data Standards, Signal Processing, Data Display, Gating, Statistical Methods, Common Data Modeling Techniques, Quantitative Cytometry	15 – 20%
LABORATORY OPERATIONS	Quality Control, Assay Validation, Safety, and Laboratory Administration	10 – 15%

For a more specific overview of the SCYM exam, please refer to the [CONTENT OUTLINE](#) starting on page 2.

SPECIALIST in CYTOMETRY, SCYM(ASCP) INTERNATIONAL SPECIALIST IN CYTOMETRY, SCYM(ASCP)ⁱ EXAMINATION CONTENT OUTLINE

IMPORTANT: Examination questions, which are related to the subtest areas outlined below, may be both theoretical and procedural. Theoretical questions measure skills necessary to apply knowledge, calculate results, and correlate patient results to disease states. Procedural questions measure skills necessary to perform laboratory techniques, evaluate laboratory data, and follow quality assurance protocols

I. INSTRUMENTATION (15 – 20%)

- A. Fluidics
 - 1. Hydrodynamic focusing and properties of sheath fluids
 - 2. Generation of differential pressures (e.g., syringe pump, pressure based)
- B. Optics
 - 1. Optical filters (e.g., long pass, band pass, short pass, dichroics, neutral density, polarizing)
 - 2. Light source (e.g., laser type, laser line, arc lamp, led)
 - 3. Lenses (e.g., beam shape, collecting, focusing, objective)
 - 4. Optical pathway (e.g., transmission, reflection, interrogation point, collinear, spatial separation, light scatter)
- C. Electronics
 - 1. Amplifiers (e.g., linear, logarithmic)
 - 2. Detectors (e.g., photomultiplier tube, photodiode, CCD camera, avalanche photon detector)
 - 3. Digital vs. analog systems
 - 4. Noise
 - 5. Pulse measurement (e.g., time delay, window extension, area, width, Coulter impedance)
 - 6. Threshold/discriminator
- 3. Sample preparation and staining (e.g., disaggregation, lysing agents, aggregates, filtering, fixation, permeabilization)
- 4. Cell enrichment (e.g., cell sorting, density gradient isolation, magnetic beads)
- B. Assay Development
 - 1. Target (e.g., cell type, subcellular location, molecule)
 - 2. Sample state for functional studies (e.g., activated, resting, proliferating)
 - 3. Probe types (e.g., antibodies, viability/DNA dyes, physiological, tracking dyes, fluorescent proteins)
 - 4. Fluorochrome selection (e.g., antigen density, protein coexpression, optimal combination, photostability, F/P ratio, quenching, signal to noise)
 - 5. Spectral overlap and compensation
 - 6. Assay controls (e.g., fluorescence minus one (FMO), autofluorescence, biological systems control, background measurement controls)
 - 7. Assay optimization (e.g., appropriate use of limited sample, frequency of target, cell concentration, kinetics, scalability, blocking, statistical design)

II. PANEL/EXPERIMENT DESIGN (25 – 30%)

- A. Sample
 - 1. Sample source (e.g., beads, blood, bone marrow, solid tissue, body fluids, subcellular components, cultured cells, microorganisms, plants, whole organisms)
 - 2. Sample integrity (e.g., collection, handling, storage viability)

III. APPLICATIONS (25 – 30%)

- A. Immunophenotyping (e.g., immunologic evaluations, hematologic disorders)
- B. Functional Assays (e.g., cytokines, chronic granulomatous disease, calcium flux, phospho flow)
- C. Multiplex Bead Assays (e.g., cytokines, proteins, chemokines)
- D. Solid Organ Transplant (e.g., HLA crossmatch)
- E. Stem Cell Analysis (e.g., CD34 absolute counts)
- F. Cell Cycle / DNA Ploidy

- G. Rare Event Analysis (e.g., circulating tumor cells, minimal residual disease, circulating endothelial cells)
- H. Microparticle Analysis
- I. Fetal Hemoglobin Assay
- J. Cell Sorting
- K. Imaging Cytometry

IV. DATA (15 – 20%)

- A. Data Standards (e.g., image file format, FCS format, listmode, MIFlowCyt checklist, storage requirements)
- B. Signal Processing (e.g., binning, compensation, pulse processing, baseline restoration, background correction)
- C. Data Display (e.g., types of displays, transformations)
- D. Gating (e.g., hierarchical vs. Boolean gating, gates, regions)
- E. Statistical Methods (e.g., central tendency, standard deviation, CV, KS statistics, cluster analysis, principal component analysis, discriminant analysis)
- F. Common Data Modeling Techniques (e.g., cell cycle analysis, proliferation, phenotyping, ratiometric)
- G. Quantitative Cytometry (e.g., molecules of equivalent soluble fluorochrome [MESF], absolute counts)

V. LABORATORY OPERATIONS (10 – 15%)

- A. Quality Control
 - 1. Instrument quality control (e.g., optical alignment, detector calibration)
 - 2. Reagent quality control (e.g., panel verification, titration, lot to lot variation, storage, handling)
 - 3. Sample integrity
 - 4. Appropriate sample quality controls selection (internal, external)
 - 5. Trend analysis and interpretation
- B. Assay Validation
 - 1. Method validation (e.g., accuracy, reproducibility/precision, sensitivity, specificity, linearity, reference range, robustness)
 - 2. Method calibration (e.g., standards, controls)

- C. Safety
 - 1. Biosafety procedures (e.g., biosafety categories, Personal Protective Equipment, specimen transport and preparation precautions, aerosols, decontamination)
 - 2. Instrument safety (e.g., lasers, electronics)
 - 3. Chemical safety (e.g., mutagenic agents, cytotoxic agents)
 - 4. Environmental safety (e.g., waste disposal)
- D. Laboratory Administration
 - 1. Financial (e.g., budgets, capital equipment acquisition, cost analysis, reimbursement, purchasing, inventory)
 - 2. Operations (e.g., customer service, facility management, information technology)
 - 3. Personnel (e.g., staffing and productivity, performance standards, training and evaluation)
 - 4. Quality management (e.g., continuous quality improvement, risk management/medical-legal issues)

Examples provided (as indicated by e.g.) are not limited to those listed.

All Board of Certification examinations use conventional and SI units for results and reference intervals.

You will need to bring a non-programmable calculator with log function to the examination.

END OF CONTENT GUIDELINE