



STATE OF COLORADO  
CLASS SERIES DESCRIPTION  
JULY 2015

STATISTICAL ANALYST  
I1B1TX TO I1B5XX

**DESCRIPTION OF OCCUPATIONAL WORK**

This class series uses five professional levels in the Physical Sciences and Engineering Occupational Group and describes work in providing statistical data analysis. The work supports management decisions on planning or evaluating the agency operations, demographics, or research areas. Work involves application of the principles and theories of mathematics and statistics by either manual or automated means. The primary focus of this class is work involving the use of inferential statistics, rather than work related to the use of descriptive statistics to report data. Typical work includes, but is not limited to, using sampling techniques, examining or constructing models, analyzing results, and reporting, estimating, or predicting statistical populations. Positions involved in statistical analysis of agency operations are typically concerned with providing statistical analyses and data to explain and predict changes in agencies' programmatic areas such as health care and vital statistics, inmates, college students, human services, revenues or expenditures, labor markets, education, and others. Positions using statistics in support of demographic programs provide services and data on population or economic factors, from and between census, to other public entities throughout the state. Positions using statistics in support of research apply published statistical theories and principles to analyze and make inferences on the research work.

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**STATISTICAL ANALYST I**

I1B1TX

**CONCEPT OF CLASS**

This class describes the entry level. The use of this level is intended to provide entry professionals with work experience in the application of statistical theories, principles, and methods previously acquired by education or experience in an actual work setting. The work is structured towards applying commonly used statistical methods, formulas, measures, techniques, and principles under the guidance of higher-level professional positions. Positions are expected to perform work under the guidelines for statistical reporting, analysis, and predictions governed by unit procedures, processes, and manuals. Deviations from these established guidelines require approval in advance of any action. Work involves some interpretation of data and/or defining the significance, bias, or extension and prediction of the data to customers or users. Analysis work at this level typically does not involve estimations or projections unless it is accomplished within agency established methods and procedures. Positions in this entry level typically do not supervise others but occasionally may supervise clerical, computer, or technical data collection or analysis positions.

## **FACTORS**

**Allocation must be based on meeting all of the three factors as described below.**

Decision Making -- The range of ongoing decisions regularly made is at the operational level. Within limits set by the specific statistical process, choices involve deciding the collection, analytic and reporting operation to carry out the process. Such decisions might include which statistical measures to use or how results are presented to the user. This involves independently deciding what steps will be used, and when and how they will be completed. By nature, the statistical data needed to make decisions are numerous and variable so reasoning is needed to develop the practical course of action for completing a project within the established process. Such decisions may involve choosing between different sources of data, their compatibility, and whether the expected results will meet the requirements. While positions can deviate from the standard procedures of the unit, choices remain within a range of specified, acceptable standards, alternatives, and technical practices. An example of such a decision may involve choosing a lower or higher confidence level based on the reliability of the data analyzed.

Complexity -- The nature of, and need for, analysis and judgment is patterned as described here. positions study characteristics of the data and apply the appropriate statistical principles in order to get practical solutions in the form of standard statistical measures. Agency guidelines in the form of accepted statistical measures or computer software packages cover most situations. Judgment is needed in locating and selecting the most appropriate statistical guidelines which may change for varying circumstances as the task is repeated. An example could be the selection of appropriate integrity measures for statistical databases. This selection and interpretation of statistical guidelines involve choosing from alternatives where most are correct, but one is better than another depending on the given circumstances of the situation. As an example, the agency guideline may allow the use of either of two statistical estimating techniques, where the most appropriate one depends upon the population being analyzed or how the results are used.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as an individual contributor. The individual contributor may explain work processes and train others. The individual contributor may serve as a resource or guide by advising others on how to use processes within a system or as a member of a collaborative problem-solving team. This level may include work leader or supervisory accountability for less than two full-time equivalent positions.

## **STATISTICAL ANALYST II**

I1B2XX

### **CONCEPT OF CLASS**

This class describes the fully-operational level of statistical analysis. In addition to work described by the Statistical Analyst I class, work in this class involves the use of the principles and theories of the inferential statistics field. At this level, positions are expected to independently develop and complete a range of analyses and reports using inferential statistical measures commonly used in their field. Some applications may require modifications of those measures. Positions are expected to interpret results of these analyses and provide explanation for variances in measures used for program or research

recommendations included in reports. Positions at this level are expected to make decisions and recommendations with only administrative review and act independently based on the full knowledge of the unit's activities and missions. Positions typically consult on statistical sampling techniques, database alternatives, and on organizing and conducting analyses of operations or research activities. Statistical projects include estimates or projections where reports are based on frequencies, distributions, correlations, regressions, and other measurements of collected data. Reports include summaries, conclusions, assumptions, and recommendations based on judgement and inferential techniques. Work typically includes deciding the modification of computerized statistical packages that compile or manipulate data, and the application of the packages to such data. This class differs from the Statistical Analyst I class on the Decision Making factor and may differ in the Complexity and Purpose of Contact factors.

## **FACTORS**

**Allocation must be based on meeting all of the three factors as described below.**

Decision Making -- The range of ongoing decisions regularly made is at the process level. Within limits set by the agency's available technology and resources, program objectives and regulations established by a higher management level and professional statistical standards, the choices involve determining the analytic process by selecting statistical procedures or principles to be applied in developing a model or the set of operations that make up the process. Such a choice might include the independent selection of inferential statistical measures used by an agency or research project in reporting data. The general pattern, program, or system exists but must be individualized to be applied. This individualization requires analysis that is complex. An example could be where multiple types of statistical analyses are conducted, then compared to produce the best, desired analytic information. New analytic models or objectives require approval of higher management or the agency with authority and accountability for the program or system. As an example, changing the analytic method of statistical data reported in unemployment program summaries to the federal government might require federal agency approval.

Complexity -- The nature of, and need for, analysis and judgment is patterned, as described here. Positions study characteristics of the data and apply the appropriate statistical principles in order to get practical solutions in the form of standard statistical measures. Agency guidelines in the form of accepted statistical measures or computer software packages cover most situations. Judgment is needed in locating and selecting the most appropriate statistical guidelines which may change for varying circumstances as the task is repeated. An example could be the selection of appropriate integrity measures for statistical databases. This selection and interpretation of statistical guidelines involve choosing from alternatives where most are correct, but one is better than another depending on the given circumstances of the situation. As an example, the agency guideline may allow the use of either of two statistical estimating techniques, where the most appropriate one depends upon the population being analyzed or how the results are used.

## **OR**

The nature of, and need for, analysis and judgment is formulative, as described here. Positions evaluate the relevance and applicability or importance of statistical theories, concepts, and principles in order to adapt them to specific circumstances and/or combine them into a different approach or tactical plan. A tactical plan entails combining, modifying, or adapting statistical models, theories, etc., for a

one-time project. (Note: Long-term or strategic guidelines are evidence of complexity in the next higher level in this series.) While general analytic policy, precedent, or non-specific practices exist, they are obsolete, inadequate, or subject to continuous change so they are relevant only through approximation or analogy. For example, the design of databases would include the analysis of data integrity using statistical principles to insure validity. In conjunction with statistical theories, concepts, and principles, positions use judgment and resourcefulness in tailoring the existing analytical guidelines so they can be applied to particular agency programs. Examples of formulative types of statistics work might be where a special analysis of new types of tax revenue estimates are made to support legislation, or where a statistical prediction on a new research project is needed to support a particular grant. An example of formulative analysis and judgment might be where the statistical population has changed and the previous, commonly used estimating measures are no longer appropriate. As other measures are also incompatible, analysis is needed to combine several statistical measures to produce valid, meaningful results.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as an individual contributor. The individual contributor may explain work processes and train others. The individual contributor may serve as a resource or guide by advising others on how to use processes within a system or as a member of a collaborative problem-solving team. This level may include work leader or supervisory accountability for less than two full-time equivalent positions.

### **STATISTICAL ANALYST III**

11B3XX

#### **CONCEPT OF CLASS**

This class describes the work leader or staff authority level of statistical analysis. In addition to the work described in the Statistical Analyst II class above, positions at this level have responsibilities to perform work leader duties over other statisticians' assigned highly complex projects or programs containing vast amounts of statistical analysis. Additionally, some positions may be assigned staff authority duties by management involving the direction and policy on inferential analysis of business operations. This class differs from the Statistical Analyst II class on the Line/Staff Authority factor and may differ in the Complexity factor.

#### **FACTORS**

**Allocation must be based on meeting all of the three factors as described below.**

Decision Making -- The range of ongoing decisions regularly made is at the process level. Within limits set by the agency's available technology and resources, program objectives and regulations established by a higher management level and professional statistical standards, the choices involve determining the analytic process by selecting statistical procedures or principles to be applied in developing a model or the set of operations that make up the process. Such a choice might include the independent selection of inferential statistical measures used by an agency or research project in reporting data. The general pattern, program, or system exists but must be individualized to be applied. This individualization requires analysis that is complex. An example could be where multiple types of statistical analyses are conducted, then compared to produce the best, desired analytic information. New analytic models or objectives require approval of higher management or the agency with authority and accountability for the program or system. As an example, changing the analytic method of statistical

data reported in unemployment program summaries to the federal government might require federal agency approval.

Complexity -- The nature of, and need for, analysis and judgment is formulative, as described here. Positions evaluate the relevance and applicability or importance of statistical theories, concepts, and principles in order to adapt them to specific circumstances and/or combine them into a different approach or tactical plan. A tactical plan entails combining, modifying, or adapting statistical models, theories, etc., for a one-time project. (Note: Long-term or strategic guidelines are evidence of complexity in the next higher level in this series.) While general analytic policy, precedent, or non-specific practices exist, they are obsolete, inadequate, or subject to continuous change so they are relevant only through approximation or analogy. For example, the design of databases and would include the analysis of data integrity using statistical principles to insure validity. In conjunction with statistical theories, concepts, and principles, positions use judgment and resourcefulness in tailoring the existing analytical guidelines so they can be applied to particular agency programs. As an example, guidelines specific to assignments are often scarce, not applicable, or have gaps in specificity that require considerable interpretation and/or adaptation to issues and problems. An example of formulative analysis and

judgment might be where the statistical population has changed and the previous, commonly used probability measures are no longer appropriate. As other measures are also incompatible, creativeness is needed to combine several statistical measures to produce valid, meaningful results.

Line/Staff Authority -- The work leader is partially accountable for the work product of two or more full-time equivalent positions, including timeliness, correctness, and soundness. At least one of the subordinate positions must be in the same series or at a comparable conceptual level. Typical elements of direct control over other positions by a work leader include assigning tasks, monitoring progress and workflow, checking the product, scheduling work, and establishing work standards. The work leader provides input into supervisory decisions made at higher levels, including signing leave requests and approving work hours. This level may include positions performing supervisory elements that do not fully meet the criteria for the next level in this factor.

## **OR**

The staff authority is a pacesetter who has a unique level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. It is an essential component of the work assignment that has been delegated by management to the position. This authority directly influences management decisions within an agency. For example, management relies on such a position when making decisions regarding the direction that policy or a program should take in the staff authority's field of expertise. Managers and peers recognize and seek this level of technical guidance and direction regarding the application of a program or system within the agency or to its clients. One example of a staff authority might be the one

position that is the agency authority on predictive or analytical measures of enrollment, inmate demographics, or labor market effects on unemployment.

## STATISTICAL ANALYST IV

I1B4XX

### CONCEPT OF CLASS

This class describes the first supervisory level or senior authority level. In addition to statistical analysis work at the II level, positions in this class are unit supervisors or authorities over others involved in statistical analysis and inferential work. The work involves supervising statistical analysis work in support of organizational programs, be they public service or research. The work involves allocating resources and/or establishing guidelines for dealing with statistical analysis work. This level also includes those senior authorities performing statistical inferential analysis work. Such authorities are expected to design and apply new statistical inferential techniques and principles to agency **programs** or **systems** requiring statistical analyses and interpretation that apply a greater degree of complexity and require inferential, as well as descriptive, statistical measures. Such senior authorities are unique in an agency as the level of their expertise, the decisions impacted by their analyses, or their authority and responsibility over statistical processes are greater than the fully-operational analyst described by the statistician at level II. This class differs from the Statistical Analyst II class in Line/Staff Authority and may differ in Decision Making and/or Complexity.

### FACTORS

**Allocation must be based on meeting all of the three factors as described below.**

Decision Making -- The range of ongoing decisions regularly made is at the process level. Within limits set by the agency's available technology and resources, program objectives and regulations established by a higher management level and professional statistical standards, the choices involve determining the analytic process by selecting statistical procedures or principles to be applied in developing a model or the set of operations that make up the process. Such a choice might include the independent selection of inferential statistical measures used by an agency or research project in reporting data. The general pattern, program, or system exists but must be individualized in order to apply. This individualization requires analysis that is complex. An example could be where multiple types of statistical analyses are conducted, then compared to produce the best, desired analytic information. New analytic models or objectives require approval of higher management or the agency with authority and accountability for the program or system. As an example, changing the analytic method of statistical data reported in unemployment program summaries to the federal government might require federal agency approval.

### **OR**

The decisions regularly made are at the interpretive level. Within limits of the strategic master plan and allocated human and fiscal resources for the unit, choices involve determining tactical plans to achieve the statistical analysis objectives established by the higher management (strategic) level. This involves independently establishing what statistical analytic processes and operations will be done, developing the budget to conduct these analytic operations, and developing the staffing patterns and work units. This level includes designing and changing statistical programs, models, systems, and guidelines that will be applied by others statewide, whereas the II level decisions have less impact on agency programs. An example of such could be changing the inferential technique used by colleges to predict the significance of enrolled students by average number of credit hours accomplished in previous reporting periods. Another example would be the decisions on implementing a statewide unemployment insurance analysis program to predict future strategic cost containment objectives. By nature, this is the

first level where positions are not bound by processes or operations in their own statistical programs as a framework for decision making. There are novel or unique situations that cause uncertainties that must be addressed at this level. An example of uncertainty might involve how to handle program operations data that do not fit the criteria for inclusion or exclusion from the predicted statistical population. Through deliberate analysis and experience with these unique situations, the manager or expert determines the inferential guidelines and programs for the future.

Complexity -- The nature of, and need for, analysis and judgment is formulative, as described here. Positions evaluate the relevance and applicability or importance of statistical theories, concepts, and principles in order to adapt them to specific circumstances and/or combine them into a different approach or tactical plan. A tactical plan entails combining, modifying, or adapting statistical models, theories, etc., for a one-time project. (Note: Long-term or strategic guidelines are evidence of complexity in the next higher level in this series.) While general analytic policy, precedent, or non-specific practices exist, they are obsolete, inadequate, or subject to continuous change so they are relevant only through approximation or analogy. For example, the design of databases would include the analysis of data integrity using statistical principles to insure validity. In conjunction with statistical theories, concepts, and principles, positions use judgment and resourcefulness in tailoring the existing analytical guidelines so they can be applied to particular agency programs. Examples of formulative types of statistics work might be where a special analysis of new types of tax revenue estimates are made to support legislation, or where a statistical prediction on a new research project is needed to support a particular grant. An example of formulative analysis and judgment might be where the statistical population has changed and the previous, commonly used estimating measures are no longer appropriate. As other measures are also incompatible, analysis is needed to combine several statistical measures to produce valid, meaningful results.

### **OR**

The nature of, and need for, analysis and judgment is strategic, as described here. Positions develop guidelines to implement a statistical analysis or information management program which contributes to the achievement of the agency's mission. Guidelines exist for only a few situations. In directive situations, positions use judgment and resourcefulness to interpret circumstances in a variety of situations and establish guidelines that direct how complex statistical models or an agency's statistical analysis program will be implemented. One example of providing strategic guidance could be the development of a plan for statewide statistical analysis of the impacts that various types of taxes have on consumption in a market segment. Another example could be the directions on statistical analyses on criminal recidivism across agency lines to include inmates, parolees, and those on probation.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as a unit supervisor or senior authority. The unit supervisor is accountable, including signature authority, for actions and decisions that directly impact the pay, status, and tenure of three or more full-time equivalent positions. At least one of the subordinate positions must be in the same series or at a comparable conceptual level. The elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, signing performance plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer.

### **OR**

The senior authority is a pacesetter who has a unique level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. It is an essential component of the work assignment that has been delegated by management to the position. This authority directly influences management decisions beyond the agency. Managers and peers seek this level of technical guidance and direction as the designer of a statewide system or in a subject area for other areas of state government. Managers and peers, both internally and externally to the agency, rely on this pacesetter when making decisions regarding the direction that policy, programs, and systems should take in the pacesetter's field of expertise. One example might be the design of a statistical projection model to predict persons at-risk for a new disease that is adopted by other agencies.

## **STATISTICAL ANALYST V**

11B5XX

### **CONCEPT OF CLASS**

This is the highest level in this class series. As the highest level statistical analyst in an agency, positions direct the statistical program efforts through subordinate supervisors. Positions serve as advisors to other managers on statistical aspects of program and mission areas. Rare positions may be national experts on aspects of the field of applied inferential statistics. This class differs from the Statistical Analyst III class in its Complexity, Purpose of Contact, and/or Line/staff Authority.

### **FACTORS**

**Allocation must be based on meeting all of the three factors as described below.**

Decision Making -- The decisions regularly made are at the interpretive level. Within limits of the agency strategic master plan and allocated human and fiscal resources, choices involve determining tactical plans to achieve the statistical analysis objectives established by the higher management (strategic) level. This involves independently establishing what analytic processes and operations will be done in the agency, developing the budget, and determining the staffing patterns and work units in order to deploy statistical staff. This level includes inventing and changing statistical systems and guidelines that will be applied by others statewide. For example, a position at this level might direct the integration of the information management systems for an agency. This level is where positions are not bound by statistical prediction processes or operations in their own agency programs as a framework for decision making and there are novel or unique situations that cause uncertainties that must be addressed at this level. Through deliberate analysis and experience with these unique situations, the manager or expert determines the statistical systems, guidelines, and programs for the future of the agency. An example of such decisions would be those of the agency chief statistician whose analytic guidelines are used by other statisticians agency wide. Examples of demographic decisions could include choosing which long-range estimate or projection model is applied by other public entities; determining which demographic services will be available; or choosing population indicators to achieve more accurate estimates and projections.

Complexity -- The nature of, and need for, analysis and judgment is strategic, as described here. Positions develop guidelines to implement a statistical analysis program to achieve the agency's mission. This level of complexity is the same as described in the lower III class. An example of demographic complexity could be the development of estimation and projection guidelines to be used by government

offices that are based on changes in state government policies concerning the use of demographics for revenue projections or future water demands.

**OR**

The nature of, and need for, analysis and judgment is unprecedented, as described here. Positions originate statistical models, concepts, and theories that are new to the professional statistics field **AND** where no prototype exists in state government. At the leading edge, statistical analysis guidelines do not exist so judgment and resourcefulness are needed to develop them. One example of such would be the development of a statistical model to predict the tax revenue impacts due to the introduction of gambling in the state. An example in demography could be the development of a variant estimating model incorporating a local review process.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as a manager or leading authority. The manager must be accountable for multiple units through the direct supervision of at least two subordinate Unit Supervisors; and, have signature authority for actions and decisions that directly impact pay, status, and tenure. Elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, second-level signature on performance plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer.

**OR**

The leading authority is a pacesetter who has a rare level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. It is an essential component of the work assignment that has been delegated by management to the position. This authority directly influences management decisions and peers in the profession outside of state government. Managers and peers beyond state government recognize and seek this level of technical guidance and direction because of the recognized expertise in a subject area. For example, program managers and colleagues in other states rely on this regional or national pacesetter when making decisions regarding the direction of their policy, programs, and systems in the pacesetter's field of expertise. This reliance on, and delegation of, primary responsibility for influencing management direction, including representing the state regionally or nationally, separates this level of staff authority from all others. One example could be a leading authority on the statistical analysis of tax revenues due to the start of legalized gambling whose expertise is sought by other states' taxing authorities. Another example could be a position serving as chairperson on a national working group to solve national demographic or census estimating problems.

**DEFINITIONS**

Statistics: As used in this document, the term statistics refers to that part of the science of mathematics related to the theories, proofs, and methodologies of probability and inference, and the systematic collection and evaluation of numerical data.

Descriptive statistics: The collection, organization, and tabulation of data and the calculation of various indices which represent the characteristics of the data. (NOTE: Many types of work include the application of descriptive statistics in support of their work.)

Inferential statistics: The systematic drawing of explanations, conclusions, or predictions from the data

and its indices to a greater population.

**ENTRANCE REQUIREMENTS**

Minimum entry requirements and general competencies for classes in this series are contained in the State of Colorado Department of Personnel web site.

For purposes of the Americans with Disabilities Act, the essential functions of specific positions are identified in the position description questionnaires and job analyses.

**CLASS SERIES HISTORY**

Updated and removed the purpose of contact 6.30.2015

Effective 7/1/08 (TMM). PSE System Maintenance Study. Created work lead/staff authority level as Statistical Analyst III. Current Statistical Analyst III converted to IV and the IV to V. Published as proposed 7/31/07. On 6/20/11 the description for the II level was corrected to reflect the results of the study.

Effective 7/1/02 (DLF). PSE System Maintenance Study. Abolished specialty areas. Published as proposed 5/15/02.

Effective 9/1/93 (DLF). Job Evaluation System Revision project. Published as Proposed 3/22/93.

Created 8/1/78. Demographer, A0083/84.

Created 1/1/75. Statistical Analyst, A1540/2/4/6/7.

**SUMMARY OF FACTOR RATINGS**

<b>Class Level</b>	<b>Decision Making</b>	<b>Complexity</b>	<b>Line/Staff Authority</b>
Statistical Analyst I	Operational	Patterned	Indiv. Contributor
Statistical Analyst II	Process	Patterned or Formulative	Indiv. Contributor
Statistical Analyst III	Process	Formulative	Work Leader or Staff
Statistical Analyst IV	Process or	Formulative or Strategic	Unit Supervisor or Senior Authority
Statistical Analyst V	Interpretive	Strategic or Unprecedented	Manager or Leading Authority

ISSUING AUTHORITY: Colorado Department of Personnel and Administration