

Exam Resource Materials for NERC System Operator Certification Examinations

December 4, 2023

Prior to taking a NERC System Operator Examination, please familiarize yourself with the examination content outline for the exam you will be taking and the approved list of references. The content outline for an examination and the list of references are the best sources to use to prepare for the exams. It is the responsibility of each candidate to prepare for an examination on the subject material contained in the content outline for a particular examination.

Examination Content Outlines¹

The Content Outlines are a comprehensive listing of the job duties performed by the System Operator. The term System Operator is used as an inclusive term meant to encompass all forms of operators whose responsibility is to monitor the Bulk Electric System from a System Operation Control Center, such as, but not limited to:

- Reliability Coordinator
- Transmission Operator
- Balancing, Interchange, and Transmission Operator
- Balancing and Interchange Operator

The examination content outlines are the framework used to ensure the content validity of each NERC examination. In other words, each examination form is developed to conform to the content sampling requirements listed for each examination to ensure that the examination is an accurate representation of the knowledge, skills, tasks, and situations encountered by a system operator. These outlines were developed from a NERC-wide job analysis where system operators indicated the importance and frequency of the various job duties or tasks. The outlines are divided into the following content domains:

- Resource and Demand Balancing
- Transmission
- Emergency Preparedness
- Emergency Response
- Contingency Analysis and Reliability
- Communications and Data

¹ See the [One-Stop Shop \(System Operators Certification and Credential Maintenance Program\) \(nerc.com\)](#) under System Operator Certification Exam Materials for the current exam content outlines for each examination type.

Certification Examination Information		
Examination Type	Total Scored Questions	Cut Score*
Reliability Coordinator	120	92
Transmission Operator	100	76
Balancing, Interchange, and Transmission Operator	120	92
Balancing and Interchange Operator	100	76

*Cut scores effective June 1, 2020

Difficulty Level of Questions

Each examination form is developed to be equal in difficulty level to other administered examination forms to ensure a fair and consistent standard is applied to each examinee. To this end, each examination form consists of scored examination questions that have been administered to examinees and have acceptable statistical characteristics.

The number of correct responses required to pass (cut score) is set by a panel of practitioners using a rigorous standard setting methodology, which requires subject matter experts to establish a definition of minimum acceptable competence for each examination and conduct an evaluation of each examination question in order to set the minimum level of performance necessary on each examination to demonstrate competence.

Number of Questions

In addition to the 100 or 120 scored examination questions administered, 25 additional questions are administered which are experimental questions administered in order to collect information about the performance of those questions before use as a scored item. These 25 experimental questions DO NOT contribute to candidates' scores. Candidates are not informed which questions are either scored or experimental.

Cognitive Complexity Level of Questions

In order to assess competency across a range of tasks that differ in terms of cognitive complexity, examination questions are written according to one of three levels of cognitive complexity:

Recall

Recall questions assess the recognition of isolated information, which generally does not vary relative to the situation. This type of question will ask for information that can be directly found in a textbook or other source. They include the recall of specific facts, concepts, principles, processes, procedures, or theories.

Example:

- Operating Reserve can be provided by:
 - A. capacitor banks

- B. interruptible loads
- C. tap changers
- D. voltage regulators

Application

Application questions assess the interpretation of data and require the application of knowledge, facts, and rules to solve a problem. They include questions that require translation into another form of specific verbal, tabular or graphical data, and recognition of relationships among such data.

Example:

- Generation is not sufficient to meet load. The Balancing Area is importing to its limits and voltage is decaying. Which action should be taken by the System Operator?
 - A. Correct schedule deviation
 - B. Schedule interchange transaction
 - C. Shed load
 - D. Use the interconnection hotline

Analysis

Analysis questions require integration of a variety of concepts or elements to solve a specific problem and assess the evaluation of data and problem solving. These questions require examinees to make judgments concerning the effectiveness or appropriateness of a course of action for a situation.

Example:

- A system is connected to neighboring systems and has interchange schedules. Tie-line metering is acceptable, but frequency indication has been lost. Which is the most appropriate control mode to use?
 - A. Constant frequency
 - B. Constant net interchange
 - C. Suspend
 - D. Tie-line frequency bias

List of References

As an aid in preparation for one of the system operator certification examinations, the Personnel Certification Governance Committee has authorized the release of the following list of approved references that provide support for the content assessed on the certification examinations.

NERC Reliability Standards

- Primary interest should be given to NERC Glossary of Terms, BAL, COM, EOP, FAC, INT, IRO, PRC, TOP, and VAR Standards
- <https://www.nerc.com/pa/Stand/Pages/USRelStand.aspx>
- <https://www.nerc.com/pa/Stand/Reliability%20Standards%20Complete%20Set/RSCompleteSet.pdf>

Power System Operation, Third Edition, authors: Miller and Malinowski

- Primary interest should be given to chapters 1-3, 5-6, and 10-12
- Available from commercial book sellers

EPRI Power System Dynamics Tutorial (published July 27, 2009)

- Primary interest should be given to the Glossary and chapters 2-9 and 11
- www.epri.com, enter 1016042 in the Search window, download free

Power System SCADA and Smart Grids, First Edition, authors: Thomas and McDonald

- Primary interest should be given to the SCADA and EMS sections
- Available from commercial book sellers

Practical Power System Operation, First Edition, author: Ebrahim Vaahedi

- Primary interest should be given to chapters 2-8, 10 and 12
- Available from commercial book sellers

Electricity Generation Baseline Report (published January 2017)

- Primary interest should be given to chapters 5-13
- <https://www.nrel.gov/docs/fy17osti/67645.pdf>.

Active Power Controls from Wind Power: Bridging the Gaps (published January 2014)

- Primary interest should be given to chapters 3-4
- <https://www.energy.gov/sites/prod/files/2014/01/f6/Active%20Power%20Controls%20from%20Wind%20Power.pdf>.

Revision History

Exam Resource Materials Revision History	
Date	Revisions
12/4/2023	Replaced individual links to exam content outlines documents with a footnote 1 - See the One-Stop Shop (System Operators Certification and Credential Maintenance Program) (nerc.com) under System Operator Certification Exam Materials for the current exam content outlines for each examination type. Updated reference material formatting.
5/25/2023	Updated Reliability Standards links on page 3
3/15/2022	Updated links to for exam type content outlines
4/15/2020	Effective June 1, 2020 Updated cut scores – page 2. <ul style="list-style-type: none"> • Reliability Coordinator from 89 to 92 • Transmission Operator from 74 to 76 • Balancing, Interchange, & Transmission Operator from 89 to 92 • Balancing and Interchange Operator from 74 to 76 Added FAC and PRC – page 3.
4/29/2019	Previous posting