

National Aeronautics and Space Administration



# **NASA AEROSPACE TECHNOLOGY (AST) QUALIFICATION AND RATING REQUIREMENTS DESK GUIDE**

**Version 1**

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## **SECTION 1 – INTRODUCTION**

This section provides an overview of the document content, as well as how the information is arranged.

### **1.1 Purpose**

The purpose of this desk guide is to set forth qualification and rating requirements for the National Aeronautics and Space Administration's (NASA's) single Agency Aerospace Technology (AST) classification system. AST positions include professional, scientific and engineering positions in the 700 group occupational series that are directly related to the Agency's aerospace mission.

This desk guide includes:

- Qualification and education requirements for AST subgroups and specialties
- General provisions related to the rating and referral process
- References

This desk guide must be used in conjunction with applicable laws, regulations, and Agency policies and procedures.

### **1.2 Background**

The Agency developed and implemented the NASA Supplemental Classification System (NSCS) for AST positions in the early 1960s that recognized the Agency's unique aerospace work. During the same time, in consultation with the Office of Personnel Management (OPM), the Agency developed qualification and rating requirements for the multiple NSCS subgroups and specialties. This desk guide contains those requirements, which were previously published in NASA Procedural Requirements (NPR) 3300.1B, Appointment of Personnel To/From NASA. (Note that the subsequent version of the NPR is titled: Employment, Appointment Authorities, and Details.)

### **1.3 Applicability**

This desk guide prescribes the minimum qualification requirements and rating procedures for AST positions across the Agency. It is intended for use by Human Resources (HR) practitioners who are responsible for conducting job analysis, rating applications/resumes, and making qualification determinations for AST positions in the 700 group occupational series. This guide also serves as a resource for management officials, employees, and applicants.

### **1.4 About This Document**

This document contains information on regulations and processes relating to AST qualification requirements. The following appendix is included in this document:

- Appendix A, Acronyms and Abbreviations

## **SECTION 2 – REFERENCES**

This document contains references that, in some cases, are for specific subparagraphs; however, this section generally lists the primary document or code. In addition, when a Web link is available, it is provided here for your convenience. Since Web links may become invalid, the document names and numbers are provided as available.

The following references were either used in the preparation of this desk guide or contain supplemental information regarding the topic:

### **2.1 Federal Laws and Regulation References**

- a. 5 United States Code (U.S.C.) § 2301, Merit System Principles.
- b. 5 U.S.C. 2302 § Prohibited Personnel Practices.
- c. 5 Code of Federal Regulations (CFR) Part 300, Employment (General).
- d. 5 CFR § 335.103, Agency Promotion Programs.
- e. 29 CFR Part 1607, Uniform Guidelines on Employee Selection Procedures.

### **2.2 OPM References and Resources**

- a. OPM Delegated Examining Handbook at: [https://www.opm.gov/policy-data-oversight/hiring-authorities/competitive-hiring/deo\\_handbook.pdf](https://www.opm.gov/policy-data-oversight/hiring-authorities/competitive-hiring/deo_handbook.pdf).
- b. [OPM General Schedule \(GS\) Qualification Standards Web page](#).
  - Direct Link Location: <http://www.opm.gov/policy-data-oversight/classification-qualifications/general-schedule-qualification-standards/>
  - Link Navigation:
    - Visit the OPM site at [www.opm.gov](http://www.opm.gov).
    - Click the **Policy** tab.
    - In the left navigation pane, click the **Classification & Qualifications** link to open the drop-down menu.
    - Click the **General Schedule Qualification Standards** link.
  - This site contains group coverage qualification standards, associated individual occupational requirements, and individual qualification standards for GS occupations. It contains minimum qualification standards for each occupational series.

## **2.3 NASA References and Resources**

- a. NASA Desk Guide on the NASA Supplemental Classification System (NSCS), December 2001.

Location: NASA Position Management and Classification Web page at: <http://nasapeople.nasa.gov/positionmgt/index.htm>. Click the **NASA Supplemental Classification Desk Guide** link.

- b. NASA Supplemental Classification System AST Schematic, June 20, 2013.

Location: NASA Position Management and Classification Web page at: <http://nasapeople.nasa.gov/positionmgt/index.htm>. Click the **AST Schematic** link.

- c. NASA Supplemental Classification System AST Specialty Definitions, June 20, 2013.

Location: NASA Position Management and Classification Web page at: <http://nasapeople.nasa.gov/positionmgt/index.htm>. Click the **AST Specialty Definitions** link.

- d. NPR 3300.1, Employment, Appointment Authorities, and Details

- Location: NASA Online Directives Information System (NODIS) Web page at: <http://nodis3.gsfc.nasa.gov>, then click the **3000-3999 Human Resources and Personnel** link. Scroll to locate and select the **NPR 3300.1** link.
- This NPR was previously titled: Appointment of Personnel To/From NASA.

- e. NPR 3335.1, Internal Placement of NASA Employees.

Location: NASA Online Directives Information System (NODIS) Web page at: <http://nodis3.gsfc.nasa.gov>, then click the **3000-3999 Human Resources and Personnel** link. Scroll to locate and select the **NPR 3335.1** link.

## **SECTION 3 – OVERVIEW**

The Assistant Administrator (AA), Office of Human Capital Management (OHCM), in collaboration with Center HR Specialists and Subject Matter Experts (SMEs), is responsible for developing qualification and rating requirements for Agency AST positions. This desk guide prescribes minimum qualification and rating requirements for AST positions.

Non-AST positions are covered by the OPM GS Qualification Standards. For non-AST position information, please refer to the [OPM General Schedule \(GS\) Qualification Standards Web page](#).

### **3.1 Identification of AST Positions**

A position is properly classified as an AST if it meets the areas of work and working conditions criteria as follows:

#### **1. Areas of Work**

AST positions must be engaged in one or more of the following:

- a. The study of space phenomena.
- b. Work affected by known or unknown conditions in space or simulated space environments.
- c. The science of aeronautics.
- d. Application or research findings in space and aeronautics.

#### **2. Working Conditions**

AST positions must meet at least one of the following:

- a. Positions that are interdisciplinary, bringing into play combinations of academic disciplines which are dictated by the unique problems in the field.
- b. Positions reflecting extensions of the traditional disciplines to meet the space environment or advanced flight regimes.
- c. Positions wherein the duties require an understanding of problems peculiar to space and advanced flight regimes.

### **3.2 How to Use AST Position Information**

1. The AST position information is used when classifying a new position or when an existing position is being reviewed for re-classification as a result of a change in major duties.
2. When a position is determined to be performing unique aerospace work and therefore is determined to be an AST position, HR Specialists must use AST qualification standards when evaluating an individual's experience and education for minimum qualifications.

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3. AST qualification standards, approved by the OPM, replace OPM GS qualification standards for AST positions.

## **SECTION 4 – BASIC EDUCATION REQUIREMENTS**

Basic education requirements fall into two main categories:

- **AST-related Majors:** Applicants for AST positions must have successfully completed a bachelor's degree with a major in a field of study specified in this desk guide from a college or university that is accredited by ABET. To find out if a degree is from an ABET-accredited colleges or university, go to <http://www.abet.org>. The degree must have been received in the year of, or any year subsequent to the original date of accreditation.
- **Nonengineering Majors:** Degrees for nonengineering majors must be from colleges or universities that are accredited by recognized accrediting organizations. For a list of schools that meet this criteria, go to <http://ope.ed.gov/accreditation/>. The degree must have been received in the year of, or any year subsequent to the original date of accreditation.

### **4.1 Degree Completion and Vacancy Announcement Requirements**

When conducting college recruitment, Centers may accept applications from students who are enrolled in a qualifying degree program and are expected to complete their degree program within 9 months from the date they submit the application. However, when using this provision, Centers must ensure that vacancy announcements/recruitment materials include this provision to communicate this provision to all potential applicants. Candidates must complete all degree requirements prior to the Entrance On Duty (EOD) date.

### **4.2 Acceptable Majors**

Acceptable majors for AST positions include:

- Engineering (not engineering technology)
- Physical science
- Mathematics
- Life sciences
- Computer science
- Other fields of science

Majors in the humanities or liberal arts are generally not acceptable. However, it may be appropriate to accept majors in social science, medical, or other fields if they are closely related to the duties of positions in the Life Sciences and Systems subgroup. (Refer to paragraph 6.3, Specific Education Requirements for AST Subgroups and Specialties.)

### **4.3 Education Requirements for Specific Grade Levels**

#### **4.3.1 Education Requirements for GS-7**

When assessing applicants for GS-7 level positions based exclusively on education, refer to the table in paragraph 6.4, Education Requirements for AST Subgroups and Specialties. In the **Academic Major** column, the undergraduate college major identified will satisfy the minimum education requirement for the corresponding AST subgroups, as long as any applicable special provisions are met. These special provisions are described in paragraph 6.3, Specific Education Requirements for AST Subgroups and Specialties.

An applicant who did not complete a curriculum leading to a bachelor's degree may be determined to be eligible if they have obtained a graduate degree in an AST qualifying field.

#### **4.3.2 Education Requirements for GS-9 and Above**

When assessing applicants for positions at the GS-9 level or above based on experience gained after meeting the basic education requirements, please refer to the table in paragraph 6.4, Education Requirements for AST Subgroups and Specialties. Applicants must have majored in one of the academic disciplines identified in the **Academic Major** column.

However, when rating an applicant who has 1 year of directly related experience, the applicant is not required to meet the academic major and/or coursework requirements corresponding to the specific AST subgroup/specialty. At these grade levels, primary consideration should be given to the quality and level of experience.

An applicant who did not complete a curriculum leading to a bachelor's degree may be determined to be eligible if they have obtained a graduate degree in an AST qualifying field.

## **SECTION 5 – RATING/EVALUATING APPLICANTS AND REFERRAL**

**Applicable References:** 5 CFR Part 300 and 29 CFR Part 1607

**Note:** As of the publish date of this desk guide, a Staffing Desk Guide with procedural guidance is under development. When the Staffing Desk Guide is published, you will use both of these guides in conjunction with each other.

### **5.1 Rating/Evaluating Applicants**

HR Specialists are responsible for evaluating the qualifications of applicants to ensure that they meet the qualification requirements described in this section based on the applicant's description of their experience, training, and education. Applicants who meet minimum (basic) qualification/eligibility requirements will be further evaluated against job-related criteria developed through job analysis to determine the best qualified candidates to refer to the supervisor on the selection certificate. Qualification requirements must be included in the vacancy announcement.

Prior to the posting of a vacancy announcement, HR Specialists, with the assistance of the supervisor or his/her designated SME, will conduct a job analysis to identify the major duties/tasks and competencies that are important to successful job performance. Documentation of the job analysis must be maintained with the staffing case file.

### **5.2 AST Competencies**

In accordance with 29 CFR Part 1607, Uniform Guidelines on Employee Selection Procedures, a NASA-wide group of SMEs developed five recommended competencies that are common to AST specialties. The five competencies are as follows:

1. Knowledge of engineering and/or science specialty area.
2. Ability to identify problems, research and analyze information, and apply principles to find solutions.
3. Ability to plan and organize work.
4. Ability to communicate orally.
5. Ability to communicate in writing.

These recommended competencies, common to all AST specialties, may be replaced with different competencies. Appropriate job analysis to describe how applicants will be evaluated must be documented and maintained with the staffing case file. Candidates will be referred in accordance with applicable laws, regulations, and OPM guidance.

### **5.3 Qualification Requirements by Grade Level**

All applicants must meet the basic education requirements described in Section 4, Basic Education Requirements. In addition, applicants must meet the requirements identified in the following subparagraphs:

#### **5.3.1 Qualification Requirements for GS-7**

The applicant's education must meet the academic major and coursework requirements corresponding to the position's subgroup and specialty, as defined in paragraph 6.3, Specific Education Requirements for AST Subgroups and Specialties.

1. Applicants must meet the basic education requirements in Section 4, Basic Education Requirements.
2. In addition to the basic education requirements, applicants must possess one of the following:
  - a. 1 year of directly related/specialized experience that has positively demonstrated ability or aptitude to do aerospace research, development design, operations, or closely related functions in one of the NASA technological specialties.
  - b. Successfully completed 1 full academic year of graduate study in an appropriate field at an accredited institution.
  - c. Any equivalent combination of experience and graduate study.

**Note:** Applicants that do not meet 2a, 2b, or 2c, above, may qualify for a GS-7 position if they meet any of the criteria outlined below under "Special provisions for GS-7."

#### **Special Provisions for GS-7**

Applicants may qualify at the GS-7 level if they meet any of the following criteria:

1. Are in the upper third of their class, based on completed college work at the time of filing an application. This is the upper third of the class in the college, university, or major subdivision (e.g., school of engineering).
2. Have an average of 2.90 or better on a 4.0 scale for either all completed college work at the time of application or all college courses completed during the last 2 years of the undergraduate curriculum.
3. Have achieved a grade average of B+ (3.5 on a 4.0 scale) or better in the major field of study where such field is fully qualifying. This is either the average of all completed college work in the major field of study at the time of application or the average of all college courses completed in the major field of study during the last 2 years of the undergraduate

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curriculum. Senior students may be rated provisionally eligible under one of those criteria, provided they had the required average in the junior year. In these situations, applicants are required to submit evidence, prior to appointment, that the required average was maintained during their senior year.

4. Have been elected to membership in one of the national honorary scholastic societies meeting the minimum requirements of the Association of College Honor Societies (other than freshman honor societies).
5. Have completed 12 months under the Pathways Internship Program (does not include periods of Leave Without Pay (LWOP)) that includes:
  - At least one work period (2 months or 320 hours) equivalent to GS-5.OR
  - At least 15 months of appropriate student trainee experience which includes one work period (2 months or 320 hours) equivalent to the GS-4 level.
6. For engineering positions, have successfully completed a 5-year program of study (e.g., one designed to be completed in no less than 5 years) or at least 160 semester hours leading to a bachelor's degree in an accredited college or university.
7. For engineering positions, in addition to a professional engineering degree, have up to 12 months of experience gained as a technician or technologist equivalent to the GS-5 or higher level.
8. Have successfully completed all requirements for two bachelor's degrees, one in an appropriate field of science or engineering.
9. Have 6 months of directly related/specialized experience or training, including 3 months gained after the junior year of college. This experience may have been obtained on a part-time or intermittent basis and may have been paid or unpaid.
10. Have received honors or elective positions indicating superior leadership outside of the applicant's academic setting. Additionally, the applicant's academic standing must have been in the upper half of the graduating class.
11. Have established a pattern of completing courses that include unusual preparatory value or direct relation to the particular aerospace specialty for which they are being considered.
12. Have creative research aptitude or special talent for NASA scientific or engineering work. This must be shown by evidence obtained and documented by NASA in certifications from college professors or officials, or standardized questionnaires, or similar techniques.

### **5.3.2 Qualification Requirements for GS-9**

1. Applicants must meet the basic education requirements in Section 4, Basic Education Requirements.
2. In addition to the basic education requirements, applicants must possess one of the following:
  1. 1 year of professional experience (i.e., experience gained after completion of qualifying degree program) in an appropriate field at least equivalent in difficulty and responsibility to GS-7-level work in the Federal service.
  2. Completion of all requirements for a master's or equivalent graduate degree in an appropriate field.
  3. Completion of 2 full academic years of graduate education in an appropriate field.
  4. An equivalent combination of experience and graduate study as discussed in 1 and 2 above.

### **5.3.3 Qualification Requirements for GS-11**

1. Applicants must meet the basic education requirements in Section 4, Basic Education Requirements.
2. In addition to the basic education requirements, applicants must possess one of the following:
  - a. 1 year of professional experience in an appropriate field that is at least equivalent in difficulty and responsibility to GS-9-level work in the Federal service.
  - b. For non-research positions, completion of all requirements for a doctoral degree (i.e., Ph.D. or equivalent) in an appropriate field.
  - c. Completion of 3 full academic years of graduate education in an appropriate field.
  - d. For research positions only, completion of all requirements for a master's or equivalent graduate degree in an appropriate field.
  - e. An equivalent combination of experience and graduate education as discussed in 1 and 2 above.

### **5.3.4 Qualification Requirements for GS-12 through GS-15**

1. Applicants must meet the basic education requirements in Section 4, Basic Education Requirements.
2. In addition to the basic education requirements, applicants must meet the following requirements:

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- a. 1 year of professional experience in an appropriate field at least equivalent in difficulty and responsibility to that of the next lower grade in the Federal service.
  - b. For GS-12 research positions only, completion of all requirements for doctoral degree (Ph.D. or equivalent) in an appropriate field.
3. For all grades, qualifying experience may be either paid or volunteer experience.
4. Time spent in military service may be credited as an extension of experience gained immediately prior to entering the service, or it may be credited on its own merits, whichever is more favorable.
5. Positive evidence of highly creative or outstanding research (e.g., development of a basic principle, concept method, approach, or technique which opened the way for major advances in the field) may result in eligibility at one grade higher than that for which the applicant would normally be rated. This principle does not apply if the applicant is eligible on the basis of graduate study.

## **SECTION 6 – FIELDS OF STUDY AND SPECIFIC EDUCATION REQUIREMENTS FOR AST SUBGROUPS AND SPECIALTIES**

This section contains details on the fields of study and academic majors for each of the AST subgroups. The chart in this section provides a quick reference illustrating which academic majors are approved for each of the NASA Classification Codes (NCCs) for AST positions. Following the chart, there are specific details for each NCC. Careful review of this information is essential to ensure candidates meet the AST position requirements.

### **6.1 Specific Degree Programs**

In determining the appropriate or correct degree program, raters shall not rely on degree titles alone, since there are no standard titling practices among colleges and universities. The degree titles shown represent the degree titles normally used; therefore, this requires a level of judgment. Accordingly, raters should consult with SMEs when either a particular degree title or particular degree course content does not fit the norm.

The following are examples of degree program assessments:

- A bachelor's degree in Aeronautics from Embry-Riddle Aeronautical University does not meet the minimum education requirements for AST positions. However, the following degree programs from Embry-Riddle do meet the minimum education requirements for AST positions:
  - Undergraduate: Aerospace Engineering, Applied Meteorology (Meteorological Computer Applications and Research areas of concentration only), Civil Engineering, Computational Mathematics, Computer Engineering, Computer Science, Electrical Engineering, Engineering Physics, Mechanical Engineering, Software Engineering, and Space Physics.
  - Graduate: Aerospace Engineering, Mechanical Engineering, Software Engineering, Engineering Physics.
- A master of science (M.S.) degree from the University of Central Florida (UCF) in Industrial Engineering and Management Systems does not meet the minimum education requirements for AST positions. However, an M.S. degree in Industrial Engineering from UCF does meet the AST minimum education requirement.
- A master's degree in Industrial and Systems Engineering (Engineering Management track) from the University of Florida Outreach Engineering Management Program does not meet the AST minimum education requirement.

## **6.2 Course Content Review for Computer Science Degrees**

One degree title that needs close course content review is the bachelor's degree in Computer Science. A number of schools use this title for essentially business-oriented degrees. To qualify for AST positions, the computer science curriculum must have included (or be supplemented by) 30 semester hours (or 45 quarter hours) of course work in a combination of mathematics, statistics, and computer science that provided in-depth knowledge of the following:

1. Theoretical foundations and practical applications of computer science, including digital computer system architecture and system software organization, the representation and transformation of information structures, and the theoretical models for such representations and transformations.
2. Essential mathematical and statistical techniques. At least 15 of the 30 semester hours must be in any combination of statistics and mathematics that include differential and integral calculus. Candidates must also meet one of the special provisions or additional experience requirements for GS-7-level positions.

## **6.3 Specific Education Requirements for AST Subgroups and Specialties**

This paragraph contains specific information to be used with the notations in the chart in paragraph 6.4, Education Requirements for AST Subgroups and Specialties. This paragraph is organized into subparagraphs for each NCC identified in the chart.

### **General Instructions**

The undergraduate college majors in the **Academic Major** column are qualifying if marked with an "X" in the subgroup column.

**EXAMPLE:** A degree in Aerospace Engineering meets the education requirements for a position classified in the Space Sciences (NCC 701-XX) subgroup.

- **If the letter "X" is joined with a second letter** ("a," "b," "c," or "d"), then additional requirements must be met. The specific requirements are defined under the AST subgroup discussions below.

**EXAMPLE:** A degree in Astronomy meets the education requirements for a position classified in the Space Sciences (NCC 701-XX) subgroup only if the curriculum includes or is supplemented by one physics or engineering lab in: electronics, optics, materials, vibration, high-vacuum theory, heat transfer, or a comparable field relating to aerospace instrumentation.

- **If the letter “X” is joined with multiple second letters** (e.g., “Xab” or “Xbc”), the major must be supplemented by the additional coursework requirements described in both paragraphs corresponding to those letters. In other words, interpret “ab” as “a and b” not “a or b.”

**Note:** Do not rely exclusively on the chart when you are rating applicants for AST positions. It is important that you first read through the special subgroup explanatory notes.

### **6.3.1 Space Sciences (NCC 701-XX)**

Majors annotated with “Xa” are qualifying if the curriculum includes or is supplemented by one physics or engineering lab in: electronics, optics, materials, vibration, high-vacuum theory, heat transfer, or comparable field relating to aerospace instrumentation.

### **6.3.2 Earth Sciences (NCC 702-XX)**

Majors annotated with “Xa” are qualifying if both of the following apply:

- The curriculum includes or is supplemented by 6 semester hours or the equivalent in appropriate life sciences or other natural science courses.
- The curriculum includes, or is supplemented by, at least two courses that would provide knowledge of such subjects (as appropriate to the vacancy) as described in the following:
  - Advanced Data Analysis Methodology
  - Aerospace Instrumentation
  - Agriculture
  - Agronomy
  - Astronomy
  - Atmospheric Physics
  - Biology
  - Computer Programming
  - Computer Simulation
  - Earth Resources
  - Earth Sciences
  - Electromagnetic Radiation
  - Engineering
  - Forestry
  - Forestry and Agriculture
  - Geodesy
  - Geodynamics
  - Geography, Geology, Geophysics
  - Hydrology
  - In Situ Sensing Techniques

- Industrial Design
- Land Use Management
- Marine Resources
- Mathematics
- Meteorology
- Numerical Analysis
- Oceanography
- Optical and Radar Scanners
- Optics
- Radiative Transfer
- Remote Sensing Techniques
- Spectroscopy
- Statistics

### **6.3.3 Life Sciences and Systems (NCC 709-XX)**

Candidates must meet either of the following appropriate college majors and supplemental coursework requirements:

1. Major study in Biology (e.g., botany, zoology, biophysics, radiation biology, biochemistry, microbiology, physiology, toxicology); or Behavioral Science (e.g., experimental, physiological, or clinical psychology); or other field of life sciences appropriate for one of these specialties, including or supplemented by at least 20 semester hours of physical science or engineering (undergraduate or graduate); or experience sufficient to provide a basis for understanding, use, and interpretation of the highly specialized ground-based or in-flight measurement, environmental control, vehicle control, and other equipment required for crewed or organism-bearing aerospace flights and voyages.
2. Major study in Engineering or Physical Science appropriate for one of these specialties, including or supplemented by, at least 20 semester hours of physiology; experimental or physiological psychology; or other appropriate life sciences; or experience in biotechnology, human factors engineering, or other appropriate life sciences field.

### **6.3.4 Fluid and Flight Mechanics (NCC 710-XX)**

Majors annotated with “Xa” are qualifying if the curriculum includes or is supplemented by 12 semester hours (or the equivalent) of appropriate physical science or engineering courses.

Majors annotated with “Xb” are qualifying if the curriculum includes or is supplemented by 9 semester hours (or the equivalent) of physics, thermodynamics, fluid dynamics, or gas dynamics.

Majors annotated with “Xc” are qualifying. Note that Electrical Engineering majors with a concentration in production, transmission, and use of large-scale industrial power are not qualifying.

### **6.3.5 Materials and Structures (NCC 715-XX)**

Majors annotated with “Xa” are qualifying if they include or are supplemented by 12 semester hours (or the equivalent) in refractory ceramics, cermets, or protective coatings.

Majors annotated with “Xb” are qualifying if they include or are supplemented by 12 semester hours (or the equivalent) in strength of materials, structures, thermodynamics, and/or basic static and dynamics.

Majors annotated with “Xc” are qualifying if they include or are supplemented by 12 semester hours (or the equivalent) in physical or adaptive metallurgy, high-temperature metals and alloys, or cermets.

Majors annotated with “Xd” are qualifying if they include or are supplemented by 9 semester hours (or the equivalent) in physics, structures, materials, or other appropriate courses.

### **6.3.6 Propulsion and Power (NCC 720-XX)**

Majors annotated with “Xa” are qualifying if they include or are supplemented by one course in thermodynamics, nuclear physics, rocket propulsion fundamentals, gas dynamics, or modern or molecular physics.

Majors annotated with “Xb” are qualifying if they include or are supplemented by 9 semester hours (or the equivalent) in physics, thermodynamics, chemistry, or closely related fields.

### **6.3.7 Flight Systems (NCC 725-XX)**

1. Majors annotated by “Xa” are qualifying if they include or are supplemented by 9 semester hours (or the equivalent) in machine design, mechanics, hydraulics, dynamics, thermodynamics, mechanical design, or mechanical measurement.
2. In the areas of Reliability and Quality Assurance (725-04), Reliability (725-05), Flight Systems Safety (725-11), Quality Assurance (725-22), and Safety and Mission Assurance (725-40), there are education requirements. The education requirements fall into two categories: those with qualifying majors and those with qualifying majors that also include additional specific coursework. The following provide the requirements:

#### **a. Qualifying Majors**

There are certain bachelor’s degrees that are qualifying. Additionally, the graduate-level degrees listed must be accredited by ABET.

The following chart shows the qualifying degrees:

<b>Qualifying Bachelor’s Degrees</b>	<b>Qualifying Graduate’s Degrees (Must be accredited by ABET.)</b>
<ul style="list-style-type: none"> <li>• Aeronautical Engineering</li> <li>• Aerospace Engineering</li> <li>• Applied Mechanics</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Engineering</li> <li>• Reliability Engineering</li> <li>• Safety Engineering</li> </ul>

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Qualifying Bachelor's Degrees	Qualifying Graduate's Degrees (Must be accredited by ABET.)
<ul style="list-style-type: none"> <li>• Astronautical Engineering</li> <li>• Biomedical Engineering</li> <li>• Ceramic Engineering</li> <li>• Chemical Engineering</li> <li>• Civil Engineering</li> <li>• Computer Engineering</li> <li>• Electrical or Electronic Engineering</li> <li>• Engineering Mechanics</li> <li>• Engineering Physics</li> <li>• Industrial Engineering</li> <li>• Manufacturing Engineering</li> <li>• Materials Engineering</li> <li>• Mechanical Engineering</li> <li>• Metallurgical Engineering</li> <li>• Nuclear Engineering</li> <li>• Nuclear Engineering Physics</li> <li>• Systems Engineering</li> <li>• Systems and Control Engineering</li> <li>• Structural Engineering</li> <li>• Welding Engineering</li> </ul>	

**b. Qualifying Majors with Specific Coursework**

There are certain degrees that require specific coursework for the degree to be qualifying. A degree is qualifying if it includes or is supplemented by 18 semester hours (or equivalent) in the courses listed; and 15 of those semester hours must be in subjects marked with an asterisk. Additionally, the graduate-level degrees listed must be accredited by ABET.

The following chart shows the degrees and the specific coursework:

Qualifying Bachelor's Degrees (Must include specific coursework.)	Qualifying Graduate's Degrees (Must be accredited by ABET and include specific coursework.)	Specific Coursework (The degrees must include 18 semester hrs. of these, with 15 hrs. in * subjects.)
<ul style="list-style-type: none"> <li>• Aeronautics</li> <li>• Applied Mathematics</li> <li>• Applied Physics</li> <li>• Astronautics</li> <li>• Ceramics</li> <li>• Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Engineering</li> <li>• Reliability Engineering</li> <li>• Safety Engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Aeronautics</li> <li>• Antennas and Propagation</li> <li>• Chemistry</li> <li>• Communication Theory</li> <li>• Computer Science*</li> <li>• Digital Design</li> <li>• Dynamics*</li> </ul>

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Qualifying Bachelor's Degrees (Must include specific coursework.)	Qualifying Graduate's Degrees (Must be accredited by ABET and include specific coursework.)	Specific Coursework (The degrees must include 18 semester hrs. of these, with 15 hrs. in * subjects.)
<ul style="list-style-type: none"> <li>• Computer Science</li> <li>• Fire Protection Engineering</li> <li>• Materials Science</li> <li>• Metallurgy</li> <li>• Oceanography</li> <li>• Physics</li> <li>• Safety Science</li> </ul>		<ul style="list-style-type: none"> <li>• Electrical Engineering Fundamentals*</li> <li>• Electromagnetic Theory*</li> <li>• Electronics*</li> <li>• Fire Protection</li> <li>• Fluids*</li> <li>• Human Factors/Human Engineering*</li> <li>• Manufacturing Engineering*</li> <li>• Materials*</li> <li>• Mechanics/Mechanics of Materials*</li> <li>• Occupations Safety/Industrial Safety*</li> <li>• Physics*</li> <li>• Quality Assurance/Quality Engineering</li> <li>• Reliability</li> <li>• Risk Management</li> <li>• Safety Engineering</li> <li>• Statics*</li> <li>• Statistics*</li> <li>• Strength of Materials*</li> <li>• Structures*</li> <li>• Systems Safety*</li> <li>• Systems Engineering*</li> <li>• Thermodynamics*</li> </ul>

In determining whether coursework is qualifying, raters should ensure that the coursework reflects a breadth of knowledge rather than being concentrated in one discipline. Raters should also ensure the coursework is not in the specific field in which the degree was obtained (e.g., courses in physics may not be used to qualify an individual who majored in physics).

### **6.3.8 Measurement and Instrumentation Systems (NCC 730-XX)**

Majors annotated with “Xa” are qualifying if they include or are supplemented by two courses in solid state physics, materials, optics, statics and dynamics, electricity and electronics, electron optics, kinetic theory of gases, electromagnetic propagation or radiation, semiconductors, vibration, information theory, or heat transfer.

Majors annotated with “Xb” are qualifying unless they are in production, transmission, and use of large-scale industrial electrical power.

### **6.3.9 Data Systems and Analysis (NCC 735-XX)**

1. Majors annotated with “Xa” must include or be supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses (not required for data analysis or computer research and development positions).
2. Majors annotated with “Xb” must include or be supplemented by 6 semester hours (or the equivalent) in mathematics beyond basic calculus (i.e., any mathematics course in which basic calculus is listed as a prerequisite).
3. Majors annotated with “Xc” must include or be supplemented by at least two of the courses listed in the table for the indicated specialties.
  - a. In the areas of Data Analysis (735-05) and Computer Research and Development (735-16), there are specific coursework requirements. The degree must include or be supplemented by at least two of the following courses:
    - Compiler Construction
    - Computer Graphics
    - Computer Architecture
    - Computer Networks
    - Data Base Management
    - Data Structures
    - Differential Equations
    - Linear Algebra
    - Mathematical Statistics (if 6 semester hour course)
    - Numerical Methods/Numerical Analysis
    - Operating Systems
    - Programming Languages
    - Software Engineering
    - Theory of Equations
    - Theory of Computation
  - b. In the areas of Data Systems (735-02), Software Systems (735-03), Data Systems Analysis (735-06), Data Hardware Systems (735-13), and Theoretical Simulation Techniques (735-16), there are specific coursework requirements. The degree must include or be supplemented by at least two of the following courses:
    - Communication Theory
    - Computer Organization
    - Control Systems
    - Electricity and Magnetism

- Electrical Networks
- Electronics
- Logic Design
- Optics (for simulation)
- Solid State Physics (for transistors and tapes)

### **6.3.10 Facilities and Environmental Factors (NCC 740-XX)**

1. Majors annotated with “Xa” are qualifying if they include or are supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses.
2. In the area of Facilities Systems Safety (740-03), there are education requirements. The education requirements fall into two categories: those with qualifying majors and those with qualifying majors that also include additional specific coursework. The following provide the requirements:

#### **a. Qualifying Majors**

There are certain bachelor’s degrees that are qualifying. Additionally, the graduate-level degrees listed must be accredited by ABET.

The following chart shows the qualifying degrees:

<b>Qualifying Bachelor’s Degrees</b>	<b>Qualifying Graduate’s Degrees (Must be accredited by ABET.)</b>
<ul style="list-style-type: none"> <li>• Aeronautical Engineering</li> <li>• Aerospace Engineering</li> <li>• Applied Mechanics</li> <li>• Astronautical Engineering</li> <li>• Biomedical Engineering</li> <li>• Ceramic Engineering</li> <li>• Chemical Aerospace Engineering</li> <li>• Civil Engineering</li> <li>• Computer Engineering</li> <li>• Electrical or Electronic Engineering</li> <li>• Engineering Mechanics</li> <li>• Engineering Physics</li> <li>• Industrial Engineering</li> <li>• Manufacturing Engineering</li> <li>• Materials Engineering</li> <li>• Mechanical Engineering</li> <li>• Metallurgical Engineering</li> <li>• Nuclear Engineering</li> <li>• Nuclear Engineering Physics</li> <li>• Systems Engineering</li> <li>• Systems And Control Engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Engineering</li> <li>• Reliability Engineering</li> <li>• Safety Engineering</li> </ul>

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Qualifying Bachelor's Degrees	Qualifying Graduate's Degrees (Must be accredited by ABET.)
<ul style="list-style-type: none"><li>• Structural Engineering</li><li>• Welding Engineering</li></ul>	

**b. Qualifying Majors with Specific Coursework**

There are certain degrees that require specific coursework for the degree to be qualifying. A degree is qualifying if it includes or is supplemented by 18 semester hours (or equivalent) in the courses listed and 15 of those semester hours must be in subjects marked with an asterisk. Additionally, the graduate-level degrees listed must be accredited by ABET.

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The following chart shows the degrees and the specific coursework:

Qualifying Bachelor's Degrees (Must include specific coursework.)	Qualifying Graduate's Degrees (Must be accredited by ABET and include specific coursework.)	Specific Coursework (The degrees must include 18 semester hrs. of these, with 15 hrs. in * subjects.)
<ul style="list-style-type: none"> <li>• Aeronautics</li> <li>• Applied Mathematics</li> <li>• Applied Physics</li> <li>• Astronautics</li> <li>• Ceramics</li> <li>• Chemistry</li> <li>• Computer Science</li> <li>• Environmental Engineering</li> <li>• Fire Protection Engineering</li> <li>• Materials Science</li> <li>• Metallurgy</li> <li>• Oceanography</li> <li>• Physics</li> <li>• Safety Science</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Engineering</li> <li>• Reliability Engineering</li> <li>• Safety Engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Aeronautics</li> <li>• Antennas and Propagation</li> <li>• Chemistry</li> <li>• Communication Theory</li> <li>• Computer Science*</li> <li>• Digital Design</li> <li>• Dynamics*</li> <li>• Electrical Engineering Fundamentals*</li> <li>• Electromagnetic Theory*</li> <li>• Electronics*</li> <li>• Fire Protection</li> <li>• Fluids*</li> <li>• Human Factors/Human Engineering*</li> <li>• Manufacturing Engineering*</li> <li>• Materials*</li> <li>• Mechanics/Mechanics of Materials*</li> <li>• Occupational Safety/Industrial Safety*</li> <li>• Physics*</li> <li>• Quality Assurance/Quality Engineering</li> <li>• Reliability</li> <li>• Risk Management</li> <li>• Safety Engineering</li> <li>• Statics*</li> <li>• Statistics*</li> <li>• Strength of Materials*</li> <li>• Structures*</li> <li>• Systems Safety*</li> <li>• Systems Engineering*</li> <li>• Thermodynamics*</li> </ul>

In determining whether coursework is qualifying, raters should ensure that the coursework reflects a breadth of knowledge rather than being concentrated in one discipline and is not in the specific field in which the degree was obtained (e.g., courses in physics may not be used to qualify an individual who majored in physics).

### **6.3.11 Operations (NCC 745-XX)**

1. Majors annotated with “Xa” are qualifying if they include or are supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses.
2. For Research Pilot (745-10) positions GS-9 through GS-15, the following additional requirements apply:
  - a. Appropriate college majors include any of the majors listed in this paragraph or under Life Sciences and Systems.
  - b. In addition to the basic education requirements, candidates must have a current Federal Aviation Administration commercial pilot’s license with an instrument rating or a pilot and instrument rating from the armed services.
  - c. One or a combination of the following criteria must also be met:
    - **Requirements for GS-9:**
      - A minimum of 900 hours of pilot-in-command (or first pilot) flight time that includes at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine.
      - One year of research piloting experience.
    - **Requirements for GS-11**
      - A minimum of 1,000 hours of pilot-in-command (or first pilot) flight time that includes at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine.
      - One year of research piloting experience which must have been equivalent to grade GS-9.
    - **Requirements for GS-12 through 15**
      - A minimum of 1,500 hours of pilot-in-command (or first pilot) flight time that included at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine; plus 1 year of research piloting experience equivalent to the next lower grade.
      - For positions whose principal duties involve research and development of experimental helicopter, pilot-in-command (or first pilot) flight time in aircraft powered by engines, having a total of 1,000 horsepower or more in lieu of flight time in jet aircraft may be substituted at all grades.

### **6.3.12 Management (NCC 770-XX)**

**Note:** Positions in this specialty shall typically be filled at the GS-12 through GS-15 levels.

Majors annotated with “Xa” must include or be supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses.

Majors annotated with “Xb” must include or be supplemented by mathematics through, and including, the integral calculus level.

**Note:** In filling positions in the AST, Life Sciences Program Management specialty, the qualification requirements are those shown under NCC 709, Life Sciences and Systems.

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## 6.4 Education Requirements for AST Subgroups and Specialties

This paragraph contains a chart that identifies which academic majors are acceptable for each NCC. The notations in this chart are fully explained in paragraph 6.3, Specific Education Requirements for AST Subgroups and Specialties, which is organized into a subparagraph for each NCC.

**Note:** Do not rely exclusively on the chart when you are rating applicants for AST positions. It is important that you first read through the special subgroup explanatory notes.

Academic Major	Space Sciences	Earth Sciences	Life Sciences & Systems	Fluid & Flight Mechanics	Materials & Structures	Propulsion & Power	Flight Systems	Measurement & Instrumentation Systems	Data Systems & Analysis	Facilities & Environmental Factors	Operations	Management
	NCC 701	NCC 702	NCC 709	NCC 710	NCC 715	NCC 720	NCC 725	NCC 730	NCC 735	NCC 740	NCC 745	NCC 770
Aeronautical Eng		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Aeronautics		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Aerospace Eng	X	Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Architecture			See specific requirements							X		
Astronautical Eng	X	Xa	See specific requirements	X	X	Xb	X	X	Xbc	X	X	X
Astronautics	X	Xa	See specific requirements	X	X	X	X	X	Xbc	Xa	Xa	X
Astronomy	Xa	Xa	See specific requirements	Xa				Xa	Xbc			Xab
Astrophysics	Xa	Xa	See specific requirements	X				X	Xbc			X
Biomedical Eng		Xa	See specific requirements				X	Xa	Xbc	Xa	Xa	X
Ceramic Eng		Xa	See specific requirements		Xa		Xa		Xbc	X	X	X
Ceramics		Xa	See specific requirements		Xa		Xa		Xbc	X	X	X
Chemical Eng		Xa	See specific requirements	Xb	X	Xb	Xa	X	Xbc	X	X	X

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Academic Major	Space Sciences	Earth Sciences	Life Sciences & Systems	Fluid & Flight Mechanics	Materials & Structures	Propulsion & Power	Flight Systems	Measurement & Instrumentation Systems	Data Systems & Analysis	Facilities & Environmental Factors	Operations	Management
	NCC 701	NCC 702	NCC 709	NCC 710	NCC 715	NCC 720	NCC 725	NCC 730	NCC 735	NCC 740	NCC 745	NCC 770
Chemistry		Xa	See specific requirements		X	X	Xa	Xa	Xbc			X
Civil Eng		Xa	See specific requirements		Xb				Xbc	X	X	X
Computer Science		Xa	See specific requirements	Xa	Xb		Xa	Xa	Xbc	Xa	Xa	Xab
Computer Eng		Xa	See specific requirements	Xa	Xb		Xa	Xa	X	Xa	Xa	Xab
Earth & Planetary Science	X	Xa	See specific requirements						Xbc			Xab
Electrical Eng	X	Xa	See specific requirements	Xc		Xa	Xa	Xb	Xbc	X	X	X
Electronics Eng	X	Xa	See specific requirements	X		Xa	Xa	X	Xbc	X	X	X
Geology		Xa	See specific requirements		Xb				Xbc	Xa	Xa	Xab
Geophysics	Xa	Xa	See specific requirements						Xbc			
Industrial Eng	Xa		See specific requirements				X		Xbc	X	X	X
Materials Eng		Xa	See specific requirements		X		X		Xbc	X	X	X
Materials Science		Xa	See specific requirements		X		X		Xbc	Xa	Xa	Xb
Math, Applied	Xa	Xa	See specific requirements	Xb	Xd	Xa	Xa	Xa	Xc	Xa	Xa	Xa
Math, Pure	Xa	Xa	See specific requirements	Xa	Xd	Xb	Xa	Xa	Xac	Xa	Xa	Xa
Mechanics, Applied		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Mechanics, Eng		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Mechanical Eng		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Metallurgical Eng		Xa	See specific requirements		Xc		X		Xbc	X	X	Xb
Metallurgy		Xa	See specific requirements		Xc		X		Xbc	Xa	Xa	Xb

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Academic Major	Space Sciences	Earth Sciences	Life Sciences & Systems	Fluid & Flight Mechanics	Materials & Structures	Propulsion & Power	Flight Systems	Measurement & Instrumentation Systems	Data Systems & Analysis	Facilities & Environmental Factors	Operations	Management
	NCC 701	NCC 702	NCC 709	NCC 710	NCC 715	NCC 720	NCC 725	NCC 730	NCC 735	NCC 740	NCC 745	NCC 770
Meteorology	Xa	Xa	See specific requirements						Xbc			X
Nuclear Eng		Xa	See specific requirements	X	Xd	X	X	X	Xbc	X	X	X
Nuclear Eng Physics		Xa	See specific requirements	X	X	X	X	X	Xbc	X	X	X
Oceanography	Xa	Xa	See specific requirements					Xa	Xbc			Xab
Optical Eng	X	Xa	See specific requirements					X	Xbc	X	X	X
Physics	Xa	Xa	See specific requirements	X	X	X	X	X	Xbc	Xa	Xa	X
Physics, Applied	Xa	Xa	See specific requirements	X	X	X	X	X	Xbc	Xa	Xa	X
Physics, Eng	X	Xa	See specific requirements	X	X	X	X	X	Xbc	Xa	Xa	X
Space Science	X	Xa	See specific requirements						Xbc			Xab
Structural Eng		Xa	See specific requirements		X		X		Xbc	X	X	X
Welding Eng			See specific requirements		X		X		Xbc	X	X	Xb
Other appropriate Physical Science or Engineering Field	Xa	Xa	See specific requirements	Xa, b, or c	Xa, b, c, or d	Xa or b	Xa	Xab	Xbc	Xa	Xa	Xab

## **APPENDIX A – ACRONYMS AND ABBREVIATIONS**

Acronyms that are used in this desk guide are identified upon first use in this document. Thereafter, the acronym is used. In cases where the first or only instance of the use of an acronym is in a table or graphic, it may not be spelled out on first reference. Since many acronyms and abbreviations have multiple meanings, the following list includes those used in this guide and the applicable meaning:

<b>ACRONYM/ ABBREVIATION</b>	<b>MEANING</b>
AA	Assistant Administrator
AST	Aerospace Technology
CFR	Code of Federal Regulations
EOD	Entrance on Duty
GS	General Schedule
HR	Human Resources
LWOP	Leave Without Pay
M.S.	master of science
NASA	National Aeronautics and Space Administration
NCC	NASA Classification Code
NODIS	NASA Online Directives Information System
NPR	NASA Procedural Requirements
NSCS	NASA Supplemental Classification System
OHCM	Office of Human Capital Management
OPM	Office of Personnel Management
Ph.D.	doctor of philosophy
SME	Subject Matter Expert
UCF	University of Central Florida
U.S.C.	United States Code

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