



Artemis II Priorities and Objectives

The primary goal of Artemis II is a crewed test flight in lunar space.

Mission Priorities:

1. **Crew:** Demonstrate the ability of systems and teams to sustain the flight crew in the flight environment, and through their return to Earth.
2. **Systems:** Demonstrate systems and operations essential to a crewed lunar campaign. This ranges from ground systems to hardware in space, and operations spanning from development to launch, flight, and recovery.
3. **Hardware and Data:** Retrieve flight hardware and data, assessing performance for future missions.
4. **Emergency Operations:** Demonstrate emergency system capabilities and validate associated operations to the extent practical, such as abort operations and rescue procedures, as needed.
5. **Data and Subsystems:** Complete additional objectives to verify subsystems and validate data.

Mission Objectives:

1. Validate Exploration Ground Systems crew rescue operations (on the day of launch and during post-splashdown recovery operations)
2. Validate human-rated abort automation and operations through nominal flight
3. Demonstrate modified booster separation motor operation
4. Demonstrate Orion proximity operations using the Interim Cryogenic Propulsion Stage (ICPS) as a docking target
 - a. Demonstrate Orion handling qualities
 - b. Collect data on the impact Orion's thrusters have on the ICPS
 - c. Take long-range bearing measurements to determine Orion's position relative to the ICPS using Orion's docking camera
5. Demonstrate and validate Orion and crew systems reconfiguration essential for Earth departure operations
6. Validate Orion's service module propulsion system upgrades in flight environment
7. Validate Orion's life support system and critical crew survival systems
 - a. Complete a checkout of Orion's life support system, including metabolic loading stress test
 - b. Perform meal preparation

- c. Perform waste disposal
 - d. Monitor the atmosphere inside Orion's crew module
8. Validate crew suit system performance, including suit donning/doffing in a flight environment
9. Validate in-space stowage and logistics plans, including:
 - a. Managing trash
 - b. Stowing equipment in flight
10. Demonstrate crew support system operations for extended duration space missions
 - a. Demonstrate crew cabin depressurization and repressurization
 - b. Demonstrate crew ability to exercise and measure loads put on the spacecraft during exercise
 - c. Assess the robustness of non-critical equipment such as laptops and handheld devices
11. Demonstrate Orion environmental, communication, propulsion, navigation systems and flight crew and cabin systems
12. Demonstrate optical communications capability
13. Demonstrate crew emergency procedures, including:
 - a. Radiation shelter
 - b. Medical procedures
 - c. Fire response
 - d. Rapid crew suit donning
14. Accomplish Flight Test Objectives
15. Accomplish Development Flight Test Objectives and Development Test Objectives
16. Support payloads
 - a. ATENEA
 - b. TACHELES
 - c. Space Weather Cube Sat
 - d. K-Rad Cube
 - e. ARCHeR
 - f. Immune Biomarkers
 - g. Spaceflight Standard Measures
 - h. AVATAR
 - i. National Geographic Artemis II Mission Story
 - j. DLR M-42 Extended
 - k. Lunar Observation Campaign
17. Support imagery
 - a. Engineering imagery used to document and carry out engineering analysis of the integrated vehicle and ground system components and performance before, during, and after flight
 - b. Utilization imagery in support of payloads based in the crew module
 - c. Imagery required to support public outreach
 - d. Medical imagery related to medical and private conferences
18. Demonstrate and validate Orion and crew systems reconfiguration essential for Earth return operations
19. Demonstrate Orion heat shield performance during reentry from cislunar velocity
20. Validate post-landing crew recovery operations through egress
21. Retrieve the crew module

Flight Test Objectives:

1. Demonstrate initial atmospheric entry interface targeting under operational conditions
2. Demonstrate crew module (CM)/service module (SM) separation upon command under operational conditions
3. Demonstrate guided entry to a predetermined landing point under operational conditions
4. Demonstrate the sequence of forward bay cover jettison and drogue parachute deploy under operational conditions
5. Demonstrate the sequence of drogue release and main parachute deployment under operational conditions
6. Demonstrate the sequence of touchdown orientation, detection, and main parachute release and Crew Module Uprighting System (CMUS) initiation under operational conditions
7. Demonstrate CMUS under operational conditions
8. Obtain mid-field and far-field separation dynamics performance of the forward bay cover jettison event
9. Demonstrate nominal end-of-mission recovery of the crew module
10. Demonstrate establishment and maintenance SARSAT beacon signal from the crew module
11. Demonstrate crew module system power down and safing for recovery
12. Demonstrate nominal end-of-mission main parachute recovery and forward bay cover recovery
13. Demonstrate establishment and maintenance of Search and Rescue Satellite-Aided Tracking (SARSAT) beacon signal from the crew-worn Advanced Next Generation Emergency Locator (ANGEL) beacon
14. Demonstrate nominal end-of-mission recovery of the flight crew
15. Determine aerodynamic environments during all phases of nominal launch and ascent
16. Determine the static and dynamic aerodynamic environment of the vehicle during all phases of nominal entry/descent
17. Determine passive vent effectiveness for all phases of flight
18. Obtain data to permit ongoing assessment of heatshield and backshell aerothermodynamic environment during re-entry
19. Obtain data to permit ongoing assessment of acreage and cavity-induced boundary layer transition on the heatshield and backshell
20. Obtain data to permit ongoing assessment of reaction control system jet interaction aerothermodynamic environment during entry
21. Obtain data to permit ongoing assessment of ascent aerothermodynamic environment
22. Obtain data for assessment of in-space aerothermodynamic environments and plume impingement, including on the solar arrays
23. Determine the vibroacoustics of the crew module
24. Determine the internal and external acoustics of the crew module
25. Obtain data to assess service module internal vibroacoustics
26. Obtain data to assess service module Internal and external acoustics
27. Obtain data to assess launch abort system internal and external acoustics

28. Obtain crew module acoustic environment data in audible frequency range during all phases of nominal launch and re-entry
29. Determine the low-frequency vibration of the crew module
30. Determine the low-frequency vibration of the service module
31. Obtain data to assess the low-frequency environment of the launch abort system
32. Obtain pre-launch sway, vibration data at the crew seat interface
33. Obtain shock transmission and response on the crew module
34. Obtain shock transmission and response on the service module
35. Determine external and internal thermal environments during all mission phases
36. Determine the post-landing temperatures of the crew module surfaces through both primary and secondary egress paths
37. Obtain data to assess launch abort system hatch environments
38. Measure launch abort system tower motion to drive launch abort system/Space Launch System loads environments
39. Determine transient acceleration loads on crew
40. Obtain near-field separation dynamics data of the forward bay cover jettison event
41. Assess crew kinematic response to dynamic flight events
42. Determine crew module heatshield structural performance during ascent and on-orbit operations
43. Determine crew module heatshield structural performance during entry
44. Determine and derive load sharing and structural vehicle dynamics in all six, integrated SM longerons
45. Determine launch abort system motor adapter truss assembly structural performance during liftoff and ascent
46. Determine crew module forward bay cover preload structural performance during all mission phases
47. Demonstrate service module/spacecraft adapter fairing jettison during ascent under compression loading
48. Demonstrate launch abort system separation during nominal ascent
49. Demonstrate nominal side hatch egress operations after landing
50. Demonstrate nominal side hatch closure operations pre-launch
51. Determine the effect of varying trajectories on TPS performance
52. Obtain data to assess the performance of Avcoat block seams on heatshield TPS performance
53. Obtain data to assess the performance of Avcoat downstream of compression pads
54. Obtain data to validate the performance of backshell thermal protection system (TPS) penetrations
55. Obtain data to validate TPS design changes
56. Obtain data to support TPS anomaly investigation
57. Determine active thermal control system performance
58. Determine the performance of electrical power generation function of solar arrays; demonstrate and determine electrical power distribution system with new small cell crew module batteries energy storage system performance for nominal flight conditions during all applicable mission phases

59. Obtain data on ground support equipment loading, ground conditioning, and thermal management of gaseous pressurants and liquid hypergolic propellants
60. Demonstrate crew module propulsion system post landing processing of toxic and/or high-pressure elements
61. Determine service module propulsion pressurization control assembly performance in relevant cases
62. Determine service module propulsion propellant isolation assembly performance in relevant cases
63. Determine crew module and service module propulsion mass gauging performance
64. Demonstrate ability to reacquire GPS signal after entry ionization blackout
65. Determine guidance performance
66. Determine orbit targeting and guidance performance
67. Demonstrate a main engine translation maneuver
68. Determine main engine and thrust vector control performance
69. Determine auxiliary engine performance
70. Determine trajectory correction maneuver performance
71. Determine service module attitude control performance for nominal and off-nominal thruster configurations including use of back-up reaction control system (RCS) string and simultaneous use of both RCS strings
72. Determine mass properties estimation performance
73. Determine the Orion inertial measurement unit rotational/ translational sensing performance
74. Obtain data on water impact areas to support post-flight comparison with predictions for service module, launch abort system, forward bay cover, drogue parachutes, pilot parachutes, and service module/spacecraft adapter fairing panels
75. Determine crew module reaction control system exo-atmospheric and atmospheric performance
76. Determine performance of barometric altimeter
77. Determine GPS performance
78. Determine optical navigation performance
79. Determine sun sensor navigation performance
80. Determine star tracker navigated attitude performance
81. Determine the navigation performance of the ground-based radiometric tracking system network (including onboard systems)
82. Determine vehicle processing unit backup navigation performance
83. Determine integrated navigation system performance
84. Determine the performance of the Orion separation from the launch vehicle
85. Determine perigee and apogee raise and trans-lunar injection maneuver performance
86. Demonstrate crew manual piloting
87. Determine magnitude of environmental control and life support system (ECLSS)- and active thermal control system-generated trajectory perturbations from venting
88. Demonstrate Orion vehicle performance during manual proximity operations with ICPS
89. Demonstrate bearing measurement generation to a target vehicle using the docking camera
90. Demonstrate docking camera performance with a docking target

91. Determine the effects of wastewater venting on the docking camera bearing measurements
92. Determine performance of the drogue parachute system under operational conditions.
93. Determine the performance of the main parachute system under operational conditions
94. Determine performance of the forward bay cover parachutes
95. Determine the performance of the crew module uprighting system
96. Verify that the Orion ECLSS controls trace contaminant levels remain within nominal levels and predicted limits
97. Obtain data related to crew carbon dioxide exposure in a microgravity environment
98. Verify ECLSS Performance
99. Obtain exercise equipment session data during activation, checkout, and operations
100. Determine the habitability provided by the Orion crew module
101. Obtain ionizing radiation environment data within the Orion crew module
102. Demonstrate upload capability of enriched medical procedures
103. Demonstrate transmission capability and quality of two-way video
104. Demonstrate transmission of a private voice system
105. Demonstrate file uplink and downlink capability with the portable crew computing devices
106. Determine avionics performance for conditions that are encountered during all applicable mission phases
107. Determine displays and controls (D&C) hardware health during all mission phases
108. Demonstrate link management with Human Space Flight Communications and Tracking Network (HSF CTN) and Collaborative Network Elements
109. Determine induced environments during the ascent flight phases through ICPS disposal
110. Determine performance of ascent critical events and separation events through ICPS/Orion separation
111. Demonstrate communications, network, and tracking capabilities through ICPS/Orion separation
112. Determine performance and injection accuracies for delivery of Orion to an injection point needed to achieve the proper orbit to enable a beyond Earth-orbit mission
113. Determine control and control margin of vehicle through ICPS/Orion separation
114. Determine safe disposal of jettisoned objects from integrated vehicle during the ascent flight phases through ICPS disposal
115. Identify any potential liftoff, ascent, or separation debris capable of capture with available imagery through ICPS disposal

Demonstration Flight Test Objectives

1. Assess cabin pressure and thermal impacts on docking camera
2. Assess stray light impacts on docking camera field of view
3. Complete 24-hour cabin acoustics assessment
4. Complete toilet acoustics assessment
5. Complete flywheel acoustics assessment

6. Demonstrate cabin pressure control
7. Demonstrate emergency communication
8. Assess search, acquire, track (SAT) mode
9. Assess exercise Loads
10. Determine minimum ECLSS for exercise
11. Assess manual attitude control handling qualities
12. Assess full tail-to-sun deadbanding
13. Demonstrate suit operations
14. Complete off-nominal waste management system fit check
15. Complete orthostatic intolerance garment fit check
16. Obtain urine venting imagery
17. Demonstrate crew compartment umbilicals
18. Survey solar array wing vibration
19. Obtain exercise imagery
20. Characterize solar array wing cameras' wifi strength
21. Assess the solar array wings' capability in full shadow
22. Assess potable water dispenser performance
23. Demonstrate crew active dosimeter Bluetooth interface with crew tablets
24. Survey crew compartment windows
25. Complete on-orbit controller mount questionnaire
26. Assess flywheel hardware and software
27. Assess hearing protection
28. Assess display unit legibility during launch
29. Assess ESA (European Space Agency) EveryWear application
30. Demonstrate hybrid electronic radiation assessor (HERA) commanding
31. Demonstrate ability to restrict access to crew tablets