UNCLASSIFIED

SPACE SITUATIONAL AWARENESS ADVANCED COURSE (SSA AC)

Syllabus

Current as of: 26 Jun 17

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<th>Approval</th>
<th>Signature</th>
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<td>ASOpS/DOP</td>
<td>6/26/2017</td>
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Joseph A. Johnson
SSA AC Course Flight Chief
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ADVANCED SPACE OPERATIONS SCHOOL
Peterson AFB, Colorado

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Page 1 of 8
Table of Contents

I. SSA AC Overview ................................................................................................... 2
   SSA AC Course Goals ............................................................................................ 2
   Course objectives .................................................................................................. 2

II. Academic Policies and Procedures ........................................................................ 3
   Attendance Policy .................................................................................................. 3
   Student Participation .............................................................................................. 3
   Student Assignments/Homework .......................................................................... 3
   Course Material .................................................................................................... 3
   Evaluations ........................................................................................................... 3
   Graduation ............................................................................................................ 4
   Academic Freedom ................................................................................................. 4
   Non-Attribution Policy .......................................................................................... 4
   Instructor-Student Relations .................................................................................. 4

III. Subject Matter Areas .......................................................................................... 5
   Block I - SSA Fundamentals ................................................................................ 5
   Block II - SSA Operations .................................................................................... 5
   Block III - SSA C2 Architecture and Threats ....................................................... 5

IV. Notional SSA AC Course Schedule .................................................................... 6
I. SSA AC Course Overview

The SSA AC course is a 10-day SECRET course designed specifically for experienced ground-and space-based space surveillance system crewmembers and their appropriate counterparts in the 18 SPCS. SSA AC’s intent is to build mission area experts who can critically analyze SSA concepts and architectures; improve unit training and evaluation programs; develop effective tactics, techniques and procedures. This course will focus on current and proposed US ground- and space-based capabilities using conventional and unconventional technologies and orbital mechanics principles.

SSA AC Course Goals

Provide space professionals an understanding of SSA that can be applied to system development, acquisition, employment, and sustainment, as well as the application in joint planning and execution, and tactics, techniques, and procedures development. AFSPC requires SSA space professionals to overcome obstacles in a contested, degraded, operationally limited (CDO) environment in order to support national security objectives.

Course Objectives

After graduating from SSA AC, students will be able to:

- Comprehend Space Situational Awareness operations and identify potential improvements to the architecture using sound orbital mechanics principles
- Comprehend the contributions of radar and optical systems to Space Situational Awareness
- Analyze US, foreign, and commercial space situational awareness systems’ capabilities, limitations, and vulnerabilities
- Analyze current and future threats to space situational awareness systems and architecture
- Comprehend how Space Situational Awareness supports select JP 3-14 Mission Areas
- Apply a mission plan to a space threat scenario
II. Academic Policies and Procedures

ATTENDANCE POLICY

Attendance during all class sessions is mandatory in order to successfully graduate from the SSA AC Course. Students are expected to be on time to all lessons. Absences from class time must be pre-approved by the Flight Commander. Routine medical/dental appointments should NOT be scheduled during class time. Unexcused absences can result in elimination from the course. Students missing more than 10% of the course hours will be assessed and a recommendation forwarded to the ASOpS/CC for dismissal by an Elimination Board. The Elimination Board is comprised of the SSA AC Flight Commander/Flight Chief, ASOpS/DO, ASOpS/DE, and ASOpS/CC.

STUDENT PARTICIPATION

The course format is informal, and comprised of interactive lecture, discussion, and exercises. Participation is critical to success in reaching the learning objectives, as students typically bring a wide variety of experience and perspectives to the class. Students are encouraged to be prepared and contribute to the class discussions, as well as learn from fellow classmates’ experiences and knowledge. Additionally, students are encouraged to challenge ideas or statements that don’t seem correct -- whether made by instructors or other students -- but to do so for the purpose of gaining understanding. Bottom line: To foster the best possible learning experience, students should be prepared, engaged, and professional.

STUDENT ASSIGNMENTS/HOMEWORK

Students must complete the Distance Learning lessons listed in the ASOpS provided welcome letter prior to the start of class. It is highly recommended that all students review the course material from each day to study for quizzes and tests.

COURSE MATERIAL

Students will receive unclassified and classified handouts in this course. Students may take the unclassified handouts out of the classroom to study on their own time. Classified handouts are not allowed to leave the classroom. Please note that student-owned or supplied computers will NOT be permitted in the classroom.

EVALUATIONS

There are three written block tests at the knowledge and comprehension level of learning in this course. The minimum passing grade for each written tests is 70%. Students will be provided additional training should they fail a written test, and be given the opportunity to take an alternate test. If a student fails the second test, an academic board will be convened with the ASOpS/DO, ASOpS/DE, and ASOpS/CC to determine if the student is allowed to continue.
GRADUATION

Students must successfully attend 90% of the lessons, per the attendance policy above, score a minimum of 70% on each written test, and complete the capstone exercise to graduate.

ASOpS may authorize a waiver of graduation requirements in instances where students are unable to complete them due to extenuating circumstances. Consideration will be given to what is in the best interest of the government, service, unit, and the student.

All graduating students should plan on attending graduation. The uniform for graduation is standard class attire, not travel clothes.

ACADEMIC FREEDOM

Academic freedom is the privilege of debate with discretion on any subject related to the ASOpS curriculum within the classrooms. Guest lecturers, faculty, and students are encouraged to support or criticize any objective, policy, or opinion in the pursuit of knowledge and understanding, but with dignity and respect. Bottom line: be professional.

NON-ATTRIBUTION POLICY

Non-attribution Definition: Treating statements made in a school forum (including but not limited to seminar discussion, CD-ROM, and online) as privileged information. Refraining from associating any statements with specific individuals.

Non-attribution Policy: Statements, disagreements, and other comments made by individuals or groups in the school forum are safeguarded through the practice of non-attribution. It is acceptable to say that a “previous speaker” made a particular statement, but the speaker’s name will not be divulged.

Student Responsibility: Individuals who violate the non-attribution policy are subject to adverse administrative and disciplinary action. Military personnel subject to the UCMJ who violate the non-attribution policy are subject to disciplinary actions under the UCMJ. Cases involving civilian personnel will result in a memorandum to the civilian’s supervisor describing their violation of the ASOpS academic freedom policy. Students are also subject to faculty board action under AFCAT 36-2223, USAF Formal School, and AFI 51-602, Boards of Officers.

INSTRUCTOR-STUDENT RELATIONS

Students are encouraged to consult with instructors concerning problems with subject matter, grade computations or academic assignments. The SSA AC Course faculty is extremely interested in the success of students, and will make every effort to help settle any issues. The chain of command for resolving conflicts in academic matters is the instructor, the SSA AC Flight Commander/Flight Chief, ASOpS/DO, and the ASOpS/CC.
III. Subject Matter Areas

**BLOCK I – SSA FUNDAMENTALS**

**Overview**

This is a general block that describes the overall course – the “rules of engagement”, administrative procedures and other student administrative requirements. The block provides an overview of general SSA, law & policy, history and orbital mechanics.

**Block I Goal**

The goal of this block is for students to understand classic orbital elements (COE), orbits and proximity operations information and interpret what it means using visualization methods as well as how space law and policy affect SSA.

**BLOCK II – SSA OPERATIONS**

**Overview**

This block of instruction will provide the framework of SSA operations and will present and describe overall operational architecture as well as exploring each of the sensors that are a part of the Space Surveillance Network (SSN), their capabilities and limitations.

**Block II Goal**

The goal of this block is for students to understand the simple rules-of-thumb of decibel math, comprehend the radar/optical component of SSA operations, and recognize the importance of commercial SSA contributions.

**BLOCK III – SSA COMMAND AND CONTROL (C2) ARCHITECTURE AND THREATS**

**Overview**

This block will discuss and delineate SSA sensors and systems that are in use by foreign countries and commercial companies. It will also take a look at the C2 systems in use by commercial companies. This block will also discuss threats to SSA and how SSA relates to space control.

**Block III Goal**

The goal of this block is for students to understand current DoD space & SSA C2 architectures, analyze foreign SSA systems capabilities and identify current and future threats to US SSA.
### IV. Notional SSA AC Course Schedule

(Students will receive a current schedule on day 1 of the course.)

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<thead>
<tr>
<th>Lesson Title/Activity</th>
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<tbody>
<tr>
<td><strong>Day 1</strong></td>
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<tr>
<td>In processing / Course Overview</td>
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<tr>
<td>CC Welcome</td>
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<tr>
<td>SSA Operations</td>
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<td>SSA Law &amp; Policy</td>
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<tr>
<td>Orbital Mechanics</td>
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<td>Perturbations</td>
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<td>STK Exercise - COEs/Launch</td>
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<td><strong>Day 2</strong></td>
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<tr>
<td>Launch &amp; Maneuver</td>
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<td>Homework Review (Whiz wheel)</td>
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<td>Rendezvous &amp; Proximity Ops (RPO)</td>
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<td>COEs from Observations</td>
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<td><strong>Day 3</strong></td>
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<tr>
<td>Prediction</td>
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<td>STK Exercise - ISS Prediction</td>
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<td>Maneuver Forensics for RPO</td>
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<td>Statistical Orbit Determination</td>
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<td><strong>Day 4</strong></td>
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<tr>
<td>Block Test # 1</td>
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<td>SSN Overview</td>
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<td>Electromagnetic (EM) Spectrum</td>
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<td>Radar Overview</td>
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<td>Radar Ground-Based Sensor</td>
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<td>New Space Fence Guest Lecture</td>
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<td><strong>Day 5</strong></td>
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<tr>
<td>Optical Overview</td>
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<td>Optical Space-Based Sensors</td>
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<td>Overhead Persistent Infrared (OPIR) Overview</td>
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<tr>
<td>National Systems</td>
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<tr>
<td>Optical Ground-Based Sensors</td>
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<td>Passive RF</td>
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<td><strong>Day 6</strong></td>
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<tr>
<td>USAFA SSA Program tour</td>
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<td>Joint Space Operations Center (JSpOC)</td>
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<td>JSpOC Tools &amp; Systems</td>
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<td>JSpOC Mission System (JMS)</td>
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### Day 7
- Block 2 Test
- ExoAnalytic Tour
- Foreign Radar Sensors
- Foreign Optical Sensors

### Day 8
- SSA Sharing
- Commercial/Civil SSA Systems
- FAA & Commercial Space
- Threats to SSA
- Cyber effects on SSA

### Day 9
- Space Weather Impacts
- Block 3 Test
- Capstone Execution
- Course Feedback & Critique
- Graduation

### Day 10 Top-Off
- Optical Laser Protection Guest Lecture
- Space Tracking & Surveillance System (STSS) & SSA Guest Lecture
- OPIR and SSA
- Foreign SSA Capabilities/SSA & SIGINT Guest Lecture