The Night Sky and Astronomy

APPLICATION

This standard applies to club sponsored workshops, classes, trips and any other event dedicated to teaching appreciation for and understanding the night sky. This includes but is not limited to: courses, clinics, seminars, formal evening night sky observation trips, hardware and software use during the day, trips to dark sky locations, and astrophotography.

DEFINITIONS

Clinic is a teaching session that can be done during the day or during the evening. This can include online instruction and materials. It can include different topics such as pure practical astronomy and astrophotography theory, hands on use of telescopes and associated gear, and image processing. A clinic can be several hours, one day, or one weekend, and may or may not result in credit (graduation or badge). It is a stand-alone experience that is hands on, skill-based, rather than a lecture.

Seminar is a one-time event like a lecture or video demonstration. They are stand-aloneexperiences and are affiliated with an activity and may require a pre-requisite badge.

Event listings allow members to RSVP for friends and don't require people to have a signed waiver.

Trip (or field trip associated with a course) is an outdoor exercise for teaching and demonstration of acquired skills in astronomy. It includes travelling to a dark sky location for an evening of observing, and can include multiple consecutive nights. These will be conducted at approved dark sky locations. There are two different types of trips: Single evenings in which participants and leaders will travel to a dark sky location, and return home the same evening or early the following morning. Overnight trips will have participants travelling to a dark sky location and either camp or have some other shelter and amenities for multiple evenings. Students attending a trip must hold the Night Sky and Astronomy badge addressing dark sky etiquette and basic telescope operation.

Dark Sky Site is a specific location that has been designated as a dark sky observing and imaging location. It has minimal light pollution, and dark sky standards will be enforced by instructors. Asof Spring 2021 Goldendale Sky Village is the only committee-designated dark sky site. More may be added by the Night Sky and Astronomy committee.

Dark Sky Etiquette is the set of norms in place at dark sky sites that help ensure that night visionand risk management are practiced by all instructors and students.

ACTIVITIES

Unless otherwise indicated, all participants, leaders, and/or instructors on any activity must follow dark sky etiquette.

Students will need to complete a clinic on dark sky etiquette and telescope basics before being eligible for a trip.

Additional clinics will be developed over time, and the topics and curriculum shall beapproved by the sponsoring Night Sky and Astronomy committee.

Trips to dark sky sites for observational astronomy will have pre-planned gear setup and use activities, as well as target checklists to be created by the instructor(s). These will be dependent on the time of year of the trip.

The recommended maximum number of students for clinics is 12 per instructor.The recommended maximum number of participants for trips is 5 per leader.
The actual number of participants for a clinic or trip may be up to the discretion of theleader, but must be no greater than the maximum designated by the land manager.

EQUIPMENT

The two initial workshops that will enable Mountaineers to be certified for dark sky trips to dark sky sties for observational astronomy will require red light FOBs, Planispheres, and some instructor created content. These materials will be provided to students as part of their enrollment in the series.

Binoculars, laser pointers, telescopes, mounts, filters, and eyepieces will be used and their care taught during the workshops. These materials will be provided to the workshops, but are not to bekept by students. Students may bring their own gear from this list for use in the workshops, so long as the gear intended to be brought is approved of by the instructor ahead of time.

Trips to dark sky sites like Goldendale Sky Village should be considered as camping trips with minimal amenities. Students will be responsible for their own shelter (car/tent/RV camping), food, water, clothing and warmth. Due to dark sky etiquette at dark sky sites, campfires are not permitted. Redlight flashlights or headlamps will be required.

Instructors of clinics and trips may require additional equipment for students.

TIMINGS OF CLINICS AND TRIPS

Astronomy by its nature is dependent on the weather and cloud cover. The dates of offering for practical clinics will need to be flexible to account for forecasts and the phase of the moon. Some clinics may be offered and completed indoors no matter the weather conditions.

Trips will require a clear forecast at the dark sky location and a favorable moon phase. If trips become clouded out, then they may be rescheduled. Mountaineers policy will guide cancellationsand refunds.

LEADERS

Leaders must be approved to lead trips or teach clinics by the sponsoring Night Sky committee. They may be separately approved for clinics on visual observing, astrophotography, image processing, astronomy theory, and/or trips.

To be a Leader for Introduction to The Night Sky and Astronomy course, as well as hosting Trips, the leader must be:

- A member of the Mountaineers in good standing
- Demonstrate proficiency and knowledge in:
    - Names and identification of the constellations visible in the Northern Hemisphere
    - The two different types of coordinate systems in astronomy
    - Use of a Planisphere

  - Methods and reasons for Dark Sky Etiquette
  - Star identification and Star Hopping techniques
  - Binocular use
  - Manual visual telescope use, including different mount types, OTA types, specifications and interactions with eyepieces and filters
  - Setup and use of the telescopes, use of a finder scope or Telrad
  - Interpreting finder and star charts
  - Types of astronomical objects
  - Dark sky location safety
  - Collimation and troubleshooting of astronomical gear
- A general knowledge of Astronomy to be determined by the Night Sky and Astronomy Committee

On any clinic or trip where a youth under 18 is present, the Mountaineers Youth and Family Policy must be followed. See the Mountaineers Youth and Family Policy for more information.

PARTICIPANTS

Unless specified by the course instructor or sponsoring committee, there is no pre-requisite fortaking a Night Sky and Astronomy course.

Students attending a trip must hold the Dark Sky and Astronomy badge addressing dark sky etiquette and basic telescope operation. The clinic for dark sky etiquette and basic telescope operation will be held at a Mountaineers facility.

Students that earn the Dark Sky and Astronomy badge will have the option to take one trip to Goldendale Sky Village. Oncestudents complete the Dark Sky and Astronomy Badge, they may sign up for additional trips.

INTRODUCTION TO NIGHT SKY AND ASTRONOMY COURSE

Students will attend a multiday course with incorporated field experiences. Successful completion will lead to the award of the Night Sky and Astronomy badge.

<u>Session 1. Introduction to The Night Sky and Astronomy – Students shall learn and demonstrate:</u>

- Dark sky etiquette
  - The reason for using red light
  - Dark vision processes and protections
  - Walking and navigating in the dark
  - Using other people's gear responsibly
  - When and when not to use a laser pointer, and responsible use of the laser pointer

- Navigation terminology and use in astronomy
  - Altitude and Azimuth style coordinates
  - Right Ascension and Declination style coordinates
  - See how these methods differ using known objects.
    - If this course is done during the evening, then locating visible objects usingthese methods will be performed.

- Identification and navigation to constellations
    - Understanding and using a planisphere
    - What constellations are, and which are available during different times of the year,and why this changes over the year
    - Using a laser pointer to trace a number of constellations (responsibly, followingdark sky etiquette)

- Identification and navigation to the planets
    - Identification of the different planets that are viewable from the NorthernHemisphere
    - Discussion of seasonality and location in the sky
    - Discussion of closest approach, oppositions, and many-year cyclical nature ofaltitude and angular size
    - The timing of different features of Jupiter and its moons
    - The timing of the apparent tilt of Saturn's rings

- Use of binoculars in astronomy
    - Understanding different specifications of binoculars
    - Focusing and diopter use
    - Using binoculars to observe asterisms and features of the Moon

- Identification and navigation to asterisms
    - What asterisms are, and which are available
    - Using constellations and pointer starts to help navigate
    - Using binoculars observe the asterisms and point them out using a laser pointer

Session 2. Introduction to Telescope Use – Students shall learn and demonstrate:

- Basic use of telescopes for visual astronomy
    - Limited to manual (non computerized, non-go-to) telescopes
    - Identify and understand the basic optics of the different designs of telescopes
    - Aligning and using a finder scope or equivalent pointing tool (such as a Telrad)
    - Use a telescope to find a target using an alt-az and an equatorial style mount
    - Know what polar alignment is, and be able to perform a coarse polar alignment
    - Slew to a target and achieve focus
    - Read a star-chart and use one to navigate to an object

- Eyepieces and filters
    - Specifications of eyepieces, what they mean, which are important
    - How eyepieces interact with telescopes to provide different magnifications andfields of view
    - Limitations of optics
    - How to swap between different eyepieces in a dark situation
    - Choosing the best eyepiece for an object
    - Overview of useful visual filters
    - How to use visual filters

- Care of optics
    - Proper handling of all gear
    - Preventing dust
    - Proper storage
    - Cleaning of optical surfaces
    - Collimation (Newtonians and SCTs only)

REFERENCES

Ferris, T., Cooke, R., Schaller, A., Cooke, R. and Costanzo, A. (2015). **Nightwatch: A Practical Guideto Viewing the Universe**, 4th edition. Firefly Books, Richmond Hill, ON. ISBN: 155407147X

Astronomical League https://www.astroleague.org/
Seattle Astronomical Society https://www.seattleastro.org/
International Dark Sky Association https://www.darksky.org/

First Reading: April 21, 2021 Branch Leadership Committee
Approved: May 19, 2021 Branch Leadership Committee
Updates Approved: November 17, 2021 Branch Leadership Committee