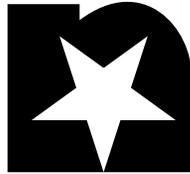


# Nordic Optical Telescope Observational Courses



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# 1 Introduction

Over the past few years various observational courses have been organized at the Nordic Optical Telescope. Much experience in organizing and hosting these courses has been gained, while also the facilities and infrastructure at the observatory have been developed and optimized for a range of educational activities.

To obtain time to use the NOT for an observational course, the organizers should contact the Director (Dr. Johannes Andersen, email: [ja@not.iac.es](mailto:ja@not.iac.es)) about one year in advance, as such requests should be reviewed by the NOT Scientific-Technical Committee and approved by the NOT Council.

Here we give an overview of what is offered to groups that want to use the NOT for an observational course, and provide general guidelines which describe the various steps in the preparation, including specific suggestions for the organizers of such a course.

Prospective course organizers should consult the [check-lists](#) provided at the end of this document to ensure that preparations are made in a timely manner: Experience shows that careful preparation is the key to success!

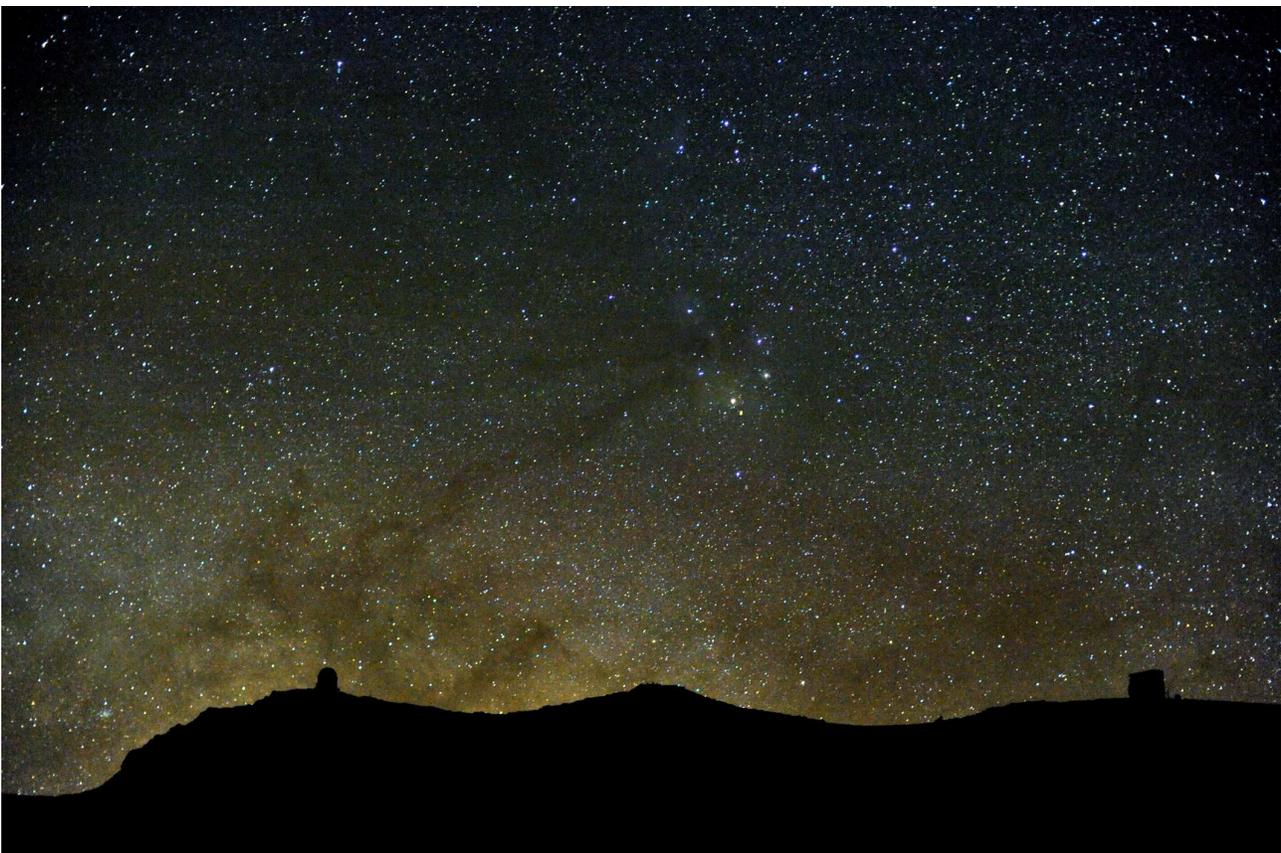


Figure 1: Silhouette of the NOT against the Milky Way (H. Dahle).

## 2 Observing courses

### 2.1 The telescope

The Nordic Optical Telescope (NOT) is a modern 2.56-meter telescope located at the highest site of the Roque de los Muchachos Observatory, which offers excellent observing conditions. The NOT is equipped with a set of optical and near-infrared instruments which are available for both on-site and remote observing courses. For more detailed information about the telescope, instrumentation, and links to previous observing courses, please consult our [web pages](#).

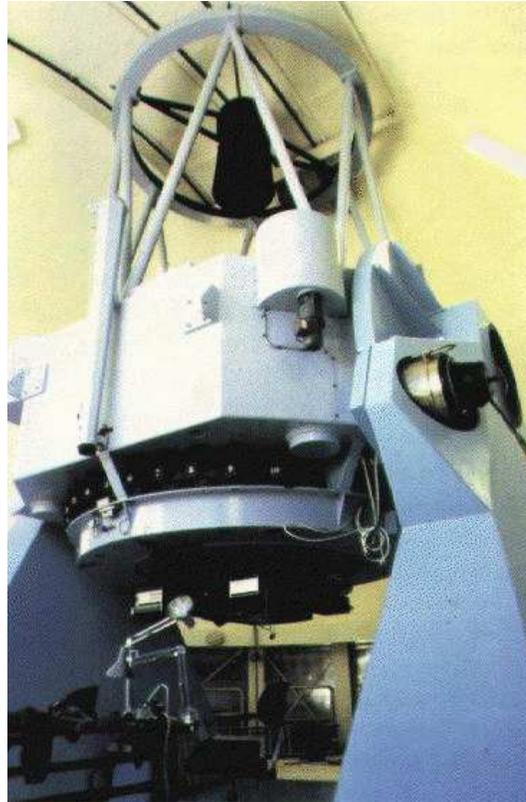


Figure 2: The Nordic Optical Telescope (M.I. Andersen)

The following instruments are normally offered for observing courses:

- ALFOSC - UV-optical imaging, polarimetry and low-resolution spectroscopy
- NOTCam - NIR imaging, polarimetry and low-resolution spectroscopy
- FIES - High-resolution, high-stability optical spectroscopy
- StanCam - Standby CCD camera

Note that ALFOSC and NOTCam can be mounted separately, but not together, at the Cassegrain focus of the telescope, while StanCam and FIES can be selected at any time at the folded Cassegrain foci. It is possible to change Cassegrain instrument in daytime during the course, while the instruments at the folded Cassegrain foci are permanently available. Remote observing is well established with FIES, ALFOSC in imaging and spectroscopy mode, and NOTCam in imaging mode; other modes can be made available if requested well in advance.

## 2.2 On-site facilities

The NOT facilities at the observatory consist of the telescope building itself and a service building located  $\sim 50$  m away. The service building houses the mechanical and electronic workshops and a common room, where an area of  $\sim 3.5\text{m} \times 6\text{m}$  can be converted to a class room setting. In the class room we can provide 3 or 4 tables which can comfortably sit 3 persons each, and in front of this we have a large projection screen ( $\sim 1.5\text{m} \times 3\text{m}$ ). During the night this screen is used to project a live copy of the display of the data acquisition computer being operated in the telescope control room.



Figure 3: The class room showing the tables and projection screen

The control room can accommodate 4–5 people, but only 2–3 can comfortably access and operate the observing system. The purpose of the separate class-room set-up is to provide a way of showing the operations of the telescope and instrument to many people at the same time. The size of the screen in the class room is such that everything is well visible for everybody. The sound from the control room is also transmitted, giving a reasonable impression of how observing is done in practice. In addition, the class room permits more detailed or extensive explanations of what is going on without interfering with the observers in the control room. Web-cams and a microphone are provided for direct communication with the control room and can be used to give instructions or ask questions. Ideally, at least one instructor familiar with the NOT should always be present in the service building during the observations to explain what is happening in the control room.

Our facilities allow a maximum of 12 students plus 2 or 3 teachers, and participants are normally divided into groups of up to 3 students, who operate the telescope and instrument(s) in shifts. The remaining students can follow what is going on at the telescope from the class room while analyzing

or discussing their previous or upcoming observations. In the daytime the class room can be used in a normal way, where the same projection equipment can be connected to a regular (laptop) computer and used for presentations. Also, a wireless Internet connection is available in the class room.

As part of our facilities for courses we offer a full set of 12 laptops for the students, with a common standard software installation on a Linux platform. In principle this includes all basic astronomy reduction and analysis packages, but the specific installation can be adapted for each course. One of the reasons for providing laptops is the relatively small area available in the class room, where they occupy very little space. However, the most important advantage is having a common computer set-up for all students, especially in cases when not all students have laptops with the necessary software installation or processing capability. It is our experience that certain applications are not always compatible with different operating systems or with other software installations on different (types of) laptops, and we have often spent significant amounts of time before and during courses to install software on different laptops, or in devising alternative solutions.

### 3 On-site observing courses

Once an on-site observing course has been approved, various preparations must be made well in advance. These are described here, both preparations that should be made by the organizers of the course and items that will be arranged by the NOT staff. If you need help with any of the preparations, you are welcome to contact us, but be aware that we are only a small group.

#### 3.1 Preparing the course

**Course program:** The overall schedule of the course should be defined well in advance (**at least 6 months**). Specifically, we need to know which instrumentation you want to use and when, and if any teaching is foreseen in the class room or at sea-level in the period before or after the actual night-time observations with the telescope. This is needed so that we can make the proper preparations and allows us to identify and solve any potential problems in advance.

**Research plan:** We also strongly recommend that the research projects for the students are defined well in advance; this is the stage where problems are met and solved, and students learn a lot. We need their observational requirements to be defined at least **3 months** in advance so we can check the feasibility and provide the proper support. This is particularly important if the project leaders do not have personal experience with the specific type of observations that are planned. Also, contingency plans should be made in case of bad weather during the course, and it should be considered whether to obtain back-up data in advance (strongly recommended!); if so, your requirements also need to be known in detail 3-4 months in advance.

When defining observations for the science projects, project leaders are encouraged to visit the NOT Fast-Track Service Program [web page](#) to get a general idea of what is needed to plan the observations. Applying for time via the Fast-Track program is also the preferred way to obtain back-up data for the project.

**Staff support:** In principle we provide normal support, i.e., astronomical support for the first night of observations with a new instrument. An introduction is then provided during the afternoon and at the start of the night, and regular technical support is on call on all other nights. If any additional (astronomy) support from the NOT staff is needed, this should be defined and agreed **at least 3 months** in advance.

**Teaching tools:** We provide a set of 12 student laptop computers with a Ubuntu-Linux operating system. The laptops are fairly modern and powerful with a Core2Duo 2.2GHz processor, 2GB RAM, and a 120GB hard disk, and have embedded wireless adapters and a DVD writer. In principle all the laptops will have the standard basic astronomy reduction and analysis packages installed (in practice the latest version of [SciSoft](#), and [FIEStool](#) if [FIES](#) is requested), but the specific installation can be adapted for each course. This should be discussed and agreed with the NOT staff at least **2 months** in advance. Note that in all cases we will provide only **a single set-up** for all laptops.

**Instrument set-up:** The detailed requirements for the set-up of the instrument(s) should be defined in advance. As for regular observing programs, an email requesting the set-up is automatically sent to the organizer(s) of the course one month in advance.

**Observing plan:** From experience we have found that it is important to have a fairly detailed plan as for who (which group) will observe at what time, what will be observed, in what way, and in which order. Of course, the precise details can be discussed and refined at the observatory shortly before the observations. However, there are many new things to learn at the same time, and observers tend to lose a lot of time if they arrive at the telescope without a detailed observing plan.

**Web-page:** To provide a central point of information for both the participants and our staff, we advise to provide a web page with information about travel and lodging (arrival and departure times, transport schedule, course program, contact information, etc). As a web site will generally already exist to announce the course to potential applicants, it is natural to add such pages there, but if needed, we can provide a temporary account and disk space on a local computer for a mirror site. This might be useful if the web pages will contain a lot of information. Note that the data from your observations will be immediately available in our ftp-area during the course (and on DVD in the morning) and will remain there for ten days the course. Please make sure to copy them to your home university/institute computers within that period.

### 3.2 Travel and lodging arrangement

**Travel to La Palma:** There are scheduled flights daily from the Spanish mainland to La Palma (airport code SPC), and to the nearby islands of Tenerife (airport codes TFN and TFS) and Gran Canaria (airport code LPA). There are also several scheduled flights a day from Tenerife and Gran Canaria to La Palma. Furthermore, there are a large number of charter flights from many European countries to Tenerife, Gran Canaria and even some to La Palma. In general, it is not difficult to find proper flights, but given that you will be travelling with a relatively large group, it is advisable to arrange the flights **at least 3 months** in advance.

**Lodging at sea-level:** There is a wide range of hotels, apartments and pensions close to the airport and in the main town of Santa Cruz de la Palma. A good place to start looking at the various possibilities are the web pages of [TourLaPalma.com](#) and the [Patronato de Turismo de La Palma](#). When it is clear what kind of accommodation is needed, it is typically better and easier to ask our administrative staff (see below) to serve as intermediates and make the detailed local arrangements. Depending a bit on the time of year, there should be no problem in finding reasonable lodging at sea-level (especially in the late-spring/early-summer period when most courses are organized), but this should not be left to the last moment and in any case be arranged at least **1-2 months** in advance.

**Lodging and food at observatory:** At the observatory room and board is provided at the 'Residencia', which is run by the Instituto de Astrofísica de Canarias (IAC). The administration of the observatory should be contacted (email: [adminorm@iac.es](mailto:adminorm@iac.es)) at least **1-2 months** in advance to make room and meal bookings (see also the [web page of the residencia](#)). Special arrangements such as requests for

special diets or shared rooms should be made at this time. All bookings should be made together by the course organizer, not by students or teachers individually.

**Transportation:** Arrangements should be made for travel from sea-level to the observatory and inside the observatory itself (going from the Residencia to the telescope is a 4-km trip on steep, winding mountain roads). There are many car hire companies on the islands; several of them have an office at the airport, and most offer the option to receive the car(s) upon arrival at the airport, making any transport to a hotel at sea-level simple. The main question is typically what kind of car you want to hire, e.g., a few 4-seater cars or one or two mini buses. Most companies have web pages in English, but when you have decided what kind of car you need for the course and at the dates you need them (from/to the airport), it is typically best to send your detailed request to our administrative staff (see below) and ask them to make the local arrangements. It is advisable to do this about one month in advance, because at some times the rental companies can be short of cars. NB: The road to the observatory is difficult and potentially dangerous, so drivers all should be reasonably experienced!

**Assistance:** For help with travel and lodging arrangements you can contact our administrator Paco Armas (email: [paco@not.iac.es](mailto:paco@not.iac.es)) and our secretary Loida Fernandez (email: [loida@not.iac.es](mailto:loida@not.iac.es)), but note that both only work half time. For any other question please contact the Deputy Director, Thomas Augusteijn (email: [tau@not.iac.es](mailto:tau@not.iac.es)). When on La Palma, you can also find us at our offices in the Mayantigo building in Santa Cruz (see [map](#)).

**Additional arrangements:** As part of the course and the visit to La Palma you may want to plan other activities, such as a visit to other telescopes at the observatory during the course or excursions to other parts of the island before or afterwards. The web provides a lot of information on possible excursions. Again, when a choice has been made, it is typically better and easier to ask our administrative staff to make the detailed local arrangements. We can also arrange for individual folders with tourist information for all the participants. In general it is best to decide such things and contact our staff well in advance. For visits to other telescopes at the observatory you specifically need to contact the administration of the observatory (email: [adminorm@iac.es](mailto:adminorm@iac.es)).

### 3.3 Running the course

**Safety:** At all times, a fundamental issue for users of the telescope is health and safety. Extensive information and advice is given on our [web page](#), and you are requested to check this in advance and provide the information to the participants of the course.

**Class room:** The NOT staff will prepare to convert part of the service building to a class room before the start of the course. This includes providing tables and chairs and setting-up and checking the projection equipment and the communication with the control room, plus any specific arrangements agreed in advance. The class room will be fully available in the morning before the first night when the telescope is used in the course, except if agreed otherwise.

**Daily program:** In our experience it is important to provide everybody with a relatively detailed daily program of activities (both day- and night-time), including transport to/from the telescope, use of the service building and telescope, any planned social program (e.g., visits to other telescopes, hiking around the national park) etc. The main reason for this is that just one person not being in the right place at the right time can cause extensive delays and complications for everybody.

**Service building:** In the service building there is a small kitchen with a cooking plate, microwave oven, coffee machine and water cooker that can be used by participants. As relatively many people will be present, we will arrange for extra supplies (drinking water, coffee, tea, sugar, toilet paper, etc.). We also will arrange for the cleaners to come more often during the course. However, we do

request that participants take care to keep the building clean (e.g., remove full garbage bags from the dust bin, put them outside and replace them with new ones, etc.).

## 4 Remote observing courses

Remote observing courses do not offer the full attraction of a visit to La Palma, but our remote observing system offers much the same look and feel” as the actual NOT control room. Remote observing is, however, much more economical in time and travel cost and can be offered to larger student groups than on-site courses. Note also that remote observing, once prepared, can also be offered for short periods (e.g. a few evening hours) as a hands-on part of a normal university course during regular term periods, without the students having to be absent from the university for even a single day. Remote observing therefore greatly expands the possible use of the NOT in a variety of training activities.

Preparing a remote observing course follows largely the same procedures and schedule as for an on-site course – see Sect. 3.1 & 3.3. However, short-term use (up to ~half a night) can be agreed informally with the Director. This should be done **at least 4 months** before the start of the semester in question, so an appropriate night can be reserved in the schedule. In general, the most fundamental difference from an on-site course is that a “remote class room” needs to be set-up. This requires both that a suitable class room should be prepared, and that the remote observing system is set-up.



Figure 4: Remote observing at Tuorla in June 2009. The active observers sit in the front row with their own monitors; the large display is for the rest of the students.

## 4.1 Preparing the course

The main requirements for a remote course are to set-up a remote observing computer at the remote course site, and to set-up and test the Internet connection to the telescope. For this to be arranged properly, we require the host university or institute to assign a person responsible for maintaining contact with the NOT computing staff to arrange issues like: the (computer) set-up in the remote observing room, data transfer tests, communication during observations, web cams, need for disk space locally and at the NOT, etc. In case of limited band-width or limited facilities at the remote observing site, we may need to change the set-up of the remote observing system provided by us. Therefore, it is essential that all interfaces are defined and tested well in advance.

At the moment we have fully commissioned remote observing modes for optical imaging with ALFOSC and near-IR imaging with NOTCam, optical spectroscopy with ALFOSC, and high-resolution optical spectroscopy with FIES, all tested in actual use. With these, a remote observer can use the instrument in basically the same way as an observer at the telescope. Other observing modes can in principle be used as well, but we do not yet have the system set-up and tested specifically for other modes. This does not exclude such other modes (e.g. polarimetric observations); the organizers must just ask for them well in advance, so proper preparation and testing can be made.

## 4.2 Running the course

We strongly recommend to arrange the remote class room similarly to what we provide on La Palma for on-site courses (see Sect. 2). To operate the remote observing system, a computer with two wide displays (dual screen) is needed. Ideally, also two data projectors and two white screens should be provided to project the displays where the (remote) observing system is operated, such that also students who are not observing themselves can follow what is going on (see Fig. 4).

During the course it is recommended to have an experienced NOT user present at the remote site (e.g. a NOT staff member or student). This improves the overall efficiency and provides quick trouble-shooting if the remote observers have problems or if there are technical problems at the NOT side. Note also that during remote observations there will always be NOT staff at the telescope monitoring the observations (primarily for safety reasons); they will also provide help if needed.

When advertising the course, the NOT web-site is a very good place to post it. If the course has its own web-page, we can link it from our front page. For previous experience with remote observing courses, please check the web pages of the NORDFORSK-sponsored remote observing courses held in 2008 at [Molėtai Observatory, Lithuania](#) in 2009 at [Tuorla Observatory, Finland](#) and in June 2010 at [Onsala Space Observatory, Sweden](#).

### 4.3 Check lists for on-site observing courses

#### 4.3.1 Start planning the course

Contact NOT Director to arrange the course (1 year in advance)

#### 4.3.2 Preparing the course

Course program (overall schedule at least 6 months in advance)

Define research plan and observational requirements (3 months in advance)

Define and arrange required staff support (3 months in advance)

Define any special software needs (2 months in advance)

Define instrument set-up (1 month in advance)

Define observing plan (1 month in advance)

Set-up web page (Course site 6 months, communications page 1 month in advance)

#### 4.3.3 Travel and lodging arrangements

Travel to La Palma (3 months in advance)

Lodging at sea-level (1-2 months in advance)

Lodging and food at observatory (1-2 months in advance)

Transportation (1 month in advance)

Other arrangements

#### 4.3.4 Running the course

Check and distribute safety information

Define class room use (1 month in advance)

Define daily program (2 weeks in advance)

#### 4.4 Check lists for remote observing course

##### 4.4.1 Start planning the course

Contact NOT Director to arrange the course (6/12 months in advance for short/long courses)

##### 4.4.2 Preparing the course

Define observing mode (if different from standard: 4 months in advance)

Course program (overall schedule at least 6 months in advance)

Assign computer contact person (3 months in advance)

Define research plan (3 months in advance)

Define instrument set-up (1 month in advance)

Speed test for Internet connection, VoIP, web-cam, data transfer (1 month in advance)

Define observing plan (1 month in advance)

Set-up web page: similar to on-site courses

##### 4.4.3 Running the course

Arrange class room

Define daily program (2 weeks in advance)