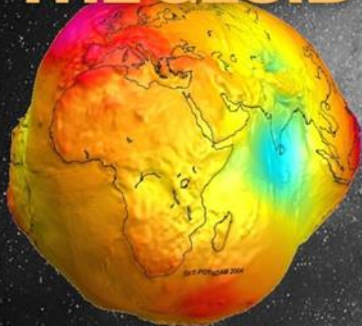







From November 13 to 17, 2023

XIV - INTERNATIONAL SCHOOL OF "THE DETERMINATION AND USE OF THE GEOID"



Intended for graduates, scientists, employees of national mapping agencies and students, to calculate and use gravimetric geoids in scientific and technical applications of Geodesy.

Registration until July 20



📍 Instituto Geográfico Nacional, Buenos Aires, Argentina

The School will be held in person and taught only in English.

Final Report

14th International School on "The Determination and Use of the Geoid"

November 13 to 17, 2023

National Geographic Institute, Buenos Aires, Argentina



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One of the main tasks of the International Geoid Service (IGS) of the International Association of Geodesy (IAG) is to organize or support schools on gravimetric geoid estimations.

The first international school for the determination and use of the geoid was organized in Milan in 1994, and since then there have been other editions of the school, held in several countries with the support of local organizing committees. In Latin America, in 1997, the second international school was developed in Rio de Janeiro, Brazil, and in 2009, the ninth international school was developed in La Plata, Argentina.

On this occasion, the XIV International School on “The Determination and Use of the Geoid” has taken place at the National Geographic Institute of Argentina. It is organised by SIRGAS (Geocentric Reference System for the Americas), in cooperation with IGN (Instituto Geográfico Nacional de la República Argentina), Instituto Panamericano de Geografía e Historia, Universidade Federal de Uberlândia, Universidad Nacional de La Plata and ISG (International Service for the Geoid).

with financing from the project of the Pan American Institute of Geography and History (PAIGH): “SIRGAS2023: Geodetic Reference Framework for the Sustainable Development of the Americas”, the National Geographic Institute, and the IAG.

The general purpose of this intensive school is to prepare students, young scientists, and employees of national agencies to calculate and use gravimetric geoids for scientific and technical applications in geodesy. The school provides an excellent opportunity to become familiar with the latest developments in geoid determination and to enhance international contacts and collaborations between scientists involved in modeling the Earth's gravity field.

Furthermore, it is of great importance that the scientific community is linked to the mapping agencies responsible for the implementation of the Global Geodetic Reference Framework for Sustainable Development (GGRF). Gravimetric geoid

modeling plays a fundamental role in the implementation of the International Height Reference Frame (IHRF) and the unification of height systems.

The school is structured into theoretical and practical lessons; students will become familiar with different theoretical formulations for calculating the gravimetric geoid and the software necessary to carry out their calculations.

English was the official language of the School.

The School took place only on site

Faculty

- Prof. Fernando Sanso mentor y creator of the International School on “The Determination and Use of the Geoid” (Politecnico di Milano, Italy) (virtual)
- Prof. Riccardo Barzaghi (Politecnico di Milano, Italy) (in person).
- Prof. Nikos Pavlis (National Geospatial Intelligence Agency, (In person).
- Prof. Rene Forsberg (National Space Insitut, DTU, Denmark). (In person).
- Prof. Laura Sánchez (DGFI-TUM), Germany. (In person).



Organizing Committee

Surveyor Eng. Sergio Cimbaro (President Instituto Geográfico Nacional, Argentina)

Cnel. Gustavo Caubarrère (President SIRGAS)

Dra. Daniela Carrion ISG, Politecnico di Milano, Italy)

Dr. Mirko Reguzzoni (ISG, Politecnico di Milano, Italy)

Dr. Gabriel Guimarães (Universidade Federal de Uberlândia, Brazil)

Dra. Claudia Tocho (National University of La Plata, Argentina)

Surveyor Eng. Hernán Guagni (Instituto Geográfico Nacional, Argentina)

Cabo. 2ª Laura Camacho (SIRGAS)

Surveyor Eng. Mariana Eiko (Universidade Federal de Uberlândia, Brazil)

Final school program

| Date | Start time | End time | Lecturer | Tepic |
|-----------------------|------------|----------|--|--|
| Monday, 13/11/2023 | 08.00 | 09.00 | Sergio Cimbaro Cnel. Gustavo Caubarrere Prof. Fernando Sanso | Welcome, opening |
| Monday, 13/11/2023 | 9.00 | 10.30 | Prof. Riccardo Barzaghi | General theory on gravity field General Theory for Geoid Computation. |
| | 10.30 | 11.00 | Coffee break | |
| | 11:00 | 12.30 | Prof. Riccardo Barzaghi | |
| | 12:30 | 2:00 | Lunch time | |
| | 2.00 | 15.30 | Prof. Riccardo Barzaghi | |
| | 15.30 | 16.00 | Coffee break | |
| | 16.00 | 17.00 | Prof. Riccardo Barzaghi | |
| Tuesday, 14/11/2023 | 9.00 | 10.30 | Prof. Nikos Pavlis | Global geopotential models. Practical exercises: global geopotential models. |
| | 10.30 | 11.00 | Coffee break | |
| | 11:00 | 12.30 | Prof. Nikos Pavlis | |
| | 12:30- | 2:00 | Lunch time | |
| | 2.00 | 15.30 | Prof. Nikos Pavlis | |
| | 15.30 | 16.00 | Coffee break | |
| | 16.00 | 17.00 | Prof. Nikos Pavlis | |
| Wednesday, 15/11/2023 | 9.00 | 10.30 | Prof. René Forsberg | Terrain effect computation and remove/restore and practical exercises |
| | 10.30 | 11.00 | Coffee break | |
| | 11:00 | 12.30 | Prof. René Forsberg | |
| | 12:30- | 2:00 | Lunch time | |
| | 2.00 | 15.30 | Prof. René Forsberg | |
| | 15.30 | 16.00 | Coffee break | |
| | 16.00 | 17.00 | Prof. René Forsberg | |
| Thursday, 16/11/2023 | 9.00 | 10.30 | Prof. Riccardo Barzaghi | Residual geoid estimation. The Collocation Method in Geodesy Practical exercises: residual geoid estimation The FFT Methods to Geodesy |
| | 10.30 | 11.00 | Coffee break | |
| | 11:00 | 12.30 | Prof. Riccardo Barzaghi | |
| | 12:30- | 2:00 | Lunch time | |
| | 2.00 | 15.30 | Prof. Riccardo Barzaghi | |
| | 15.30 | 16.00 | Coffee break | |
| | 16.00 | 17.00 | Prof. Riccardo Barzaghi | |
| Friday, 17/11/2023 | 9.00 | 10.30 | Prof. Laura Sánchez | Height systems and vertical datum unification |
| | 10.30 | 11.00 | Coffee break | |
| | 11:00 | 12.30 | Prof. Laura Sánchez | |
| | 12.30 | 17.30 | Visit to the Argentine-German Geodetic Observatory (AGGO) | |

Participants

Following the preliminary contacts (xxx people roughly), the school started with 40 participants.

| | Country | Name | Surname | e-mail | Institution |
|---|-----------|--------|---------|----------------------|---------------------------------|
| 1 | Argentina | Ariana | Dulci | aris.dulci@gmail.com | Universidad Nacional de Tucumán |

| | | | | | |
|----|-----------|---------------|-----------------------------|---------------------------------|---|
| 2 | Argentina | Apelen | Pereira | apereira@fceia.unr.edu.ar | Universidad Nacional de Rosario |
| 3 | Argentina | Agustín | Gómez | agusgomez@fcaglp.unlp.edu.ar | Universidad Nacional de La Plata |
| 4 | Argentina | Federico | Ibarra | fibarra@ign.gob.ar | Instituto Geográfico Nacional de Argentina |
| 5 | Argentina | Sebastián | Carrion | sebacarrion1984@gmail.com | Universidad Nacional del Litoral |
| 6 | Argentina | Marco Antonio | Neri Lagoria | marconeri@abc.gob.ar | Instituto Geográfico Nacional de Argentina |
| 7 | Argentina | Facundo | Barrera | facun_208@hotmail.com | Instituto Geográfico Nacional de Argentina |
| 8 | Argentina | Etchegoyen | Rosario | mretchegoyen@gmail.com | Instituto Geográfico Nacional de Argentina |
| 9 | Argentina | Micaela | Carbonetti | carbonettimicaela@gmail.com | Instituto Geográfico Nacional de Argentina |
| 10 | Austria | Andreas | Hellerschmied | andreas.hellerschmied@bev.gv.at | Federal Office of Metrology and Surveying |
| 11 | Brazil | Andrea | Santacruz Jaramillo | andreasantacruzj@gmail.com | Universidade do Estado do Rio de Janeiro |
| 12 | Brazil | Eduardo | Michalzechen Liberal Xavier | eduardo.xavier@ibge.gov.br | Instituto Brasileiro de Geografia e Estatística |
| 13 | Brazil | Ana Cristina | Oliveira Cancoro de Matos | accmatos@alumni.usp.br | Universidade de São Paulo |
| 14 | Brazil | Valéria | Silva | vsilva2@usp.br | Universidade de São Paulo |
| 15 | Brazil | Tiago | Rodrigues | tiagorodrigues@ufpr.br | Universidade Federal do Paraná |
| 16 | Brazil | Tulio | Santana | tulio.santana@ifmt.edu.br | Instituto Federal do Mato Grosso |
| 17 | Brazil | Salomão | Soares | salomao.soares@gmail.com | Instituto Brasileiro de Geografia e Estatística |
| 18 | Cameroon | Yap | Loudi | loudiyap@yahoo.fr | National Institute of Cartography |
| 19 | Chile | Sergio | Rozas | Sirgas@igm.cl | Instituto Geográfico Militar de Chile |
| 20 | Chile | Felipe Andrés | Carvajal Rodríguez | felipe.carvajalro@gmail.com | Universidade Federal do Paraná |
| 21 | Colombia | Daniela | Hernandez Beltran | daniela.hernandez@igac.gov.co | Instituto Geográfico Agustín Codazzi |
| 22 | Colombia | Leidy | Moises | leidydumoises@hotmail.com | Instituto Geográfico Agustín Codazzi |
| 23 | Colombia | Maida | Mojica | Maida.mojica@igac.gov.co | Instituto Geográfico Agustín Codazzi |
| 24 | Colombia | Karen Milena | Sierra González | karen.sierra@igac.gov.co | Instituto Geográfico Agustín Codazzi |
| 25 | Colombia | Diego | Cortes | diego.cortes@igac.gov.co | Instituto Geográfico Agustín Codazzi |
| 26 | Colombia | Juan David | Hurtado Jaimes | jdhurtadoj@gmail.com | Instituto Geográfico Agustín Codazzi |

| | | | | | |
|----|-------------|-----------------|------------------|----------------------------------|---|
| 27 | Costa Rica | Mauricio | Varela Sánchez | mauricio.varelasanchez@ucr.ac.cr | Universidad de Costa Rica |
| 28 | Costa Rica | Sara | Bastos Gutiérrez | Sara.bastos.gutierrez@una.ac.cr | Universidad Nacional |
| 29 | Guyane | Donald | Singh | donald_singh@ggmc.gov.gy | Guyana Geology and Mines Commission |
| 30 | Guyane | Clive | Nelson | clivenelsonsls@gmail.com | Guyana Lands and Surveys Commission |
| 31 | Mexico | María Elena | Osorio Tai | tai@atmosfera.unam.mx | National Autonomous University of Mexico |
| 32 | Mexico | Ana | Vidal | anavidal@uas.edu.mx | Universidad Autónoma de Sinaloa |
| 33 | Nepal | Shanker | KC | shankerc01@gmail.com | Survey Department |
| 34 | Switzerland | Julia | Koch | jukoch@ethz.ch | Swiss Federal Institute of Technology in Zürich |
| 35 | Uganda | Bruno | Kyamulesire | bkyamulesire@gmail.com | University of Cape Town |
| 36 | Uruguay | Walter Humberto | Subiza Piña | walter.subiza.pina@igm.gub.uy | Instituto Geográfico Militar de Uruguay |
| 37 | USA | Virginia | Forstall | vhfors@gmail.com | National Geospatial-Intelligence Agency |
| 38 | USA | Caitlin | Glennon | cglennon4@gmail.com | National Geospatial-Intelligence Agency |
| 39 | USA | Howard | Small | hsappel04@swbell.net | National Geospatial-Intelligence Agency |
| 40 | USA | Maxwell | Wootten | Maxwell.R.Wootten@nga.mil | National Geospatial-Intelligence Agency |



Venue:

Instituto Geográfico Nacional

Avda.Cabildo 381 C1426 - Ciudad Autónoma de Buenos Aires.

República Argentina

Distributed documents

Presentations, software, data for exercises, and GRAVSOF manual were distributed to the students.

Each student received a participation certificate.

Technical Visit:

A visit to the Argentine-German Geodetic Observatory (AGGO) was realized on Friday. The Argentinean–German Geodetic Observatory (AGGO) is a fundamental geodetic observatory located close to the city of La Plata, Argentina, where all major geodetic techniques are co-located.

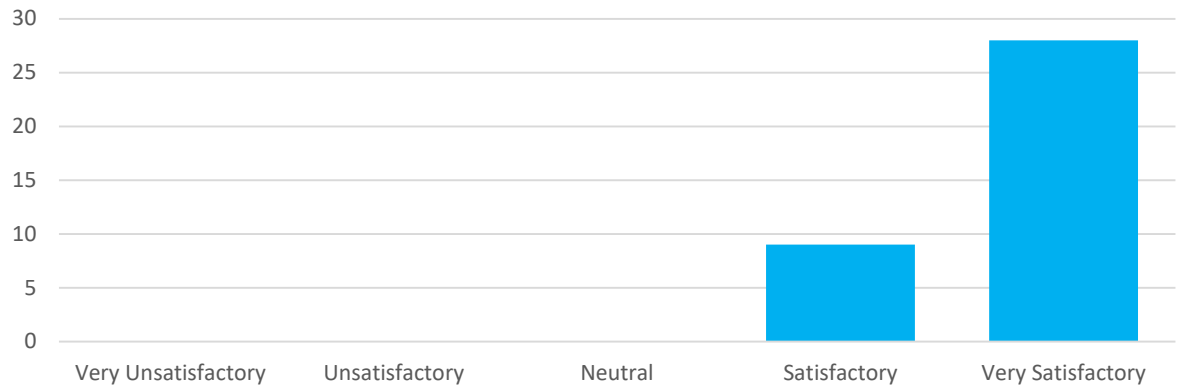


Feedback questionnaire

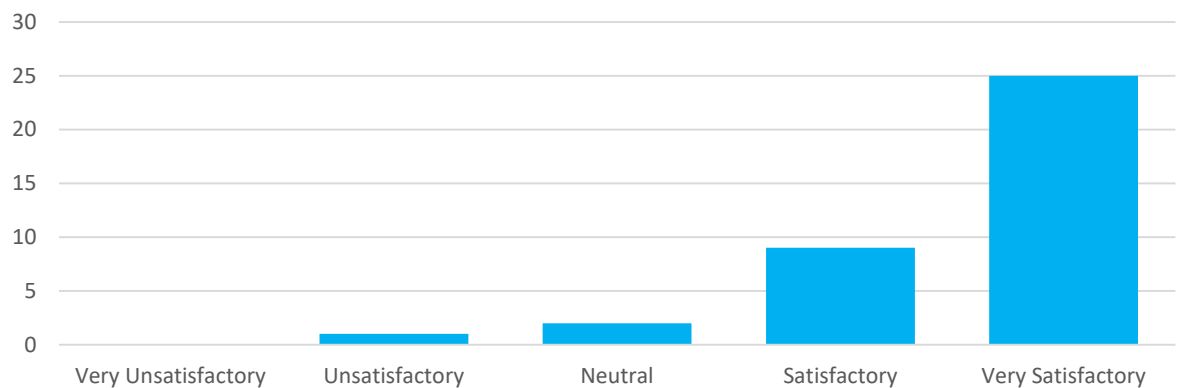
A satisfaction questionnaire has been filled up. The results are depicted in the following figures.

Logistics

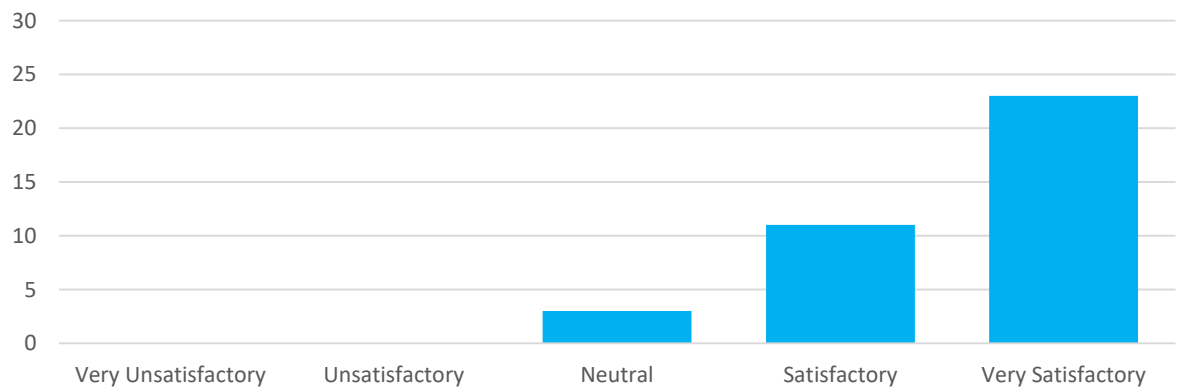
How would you rate the ease of registration and access to the course?



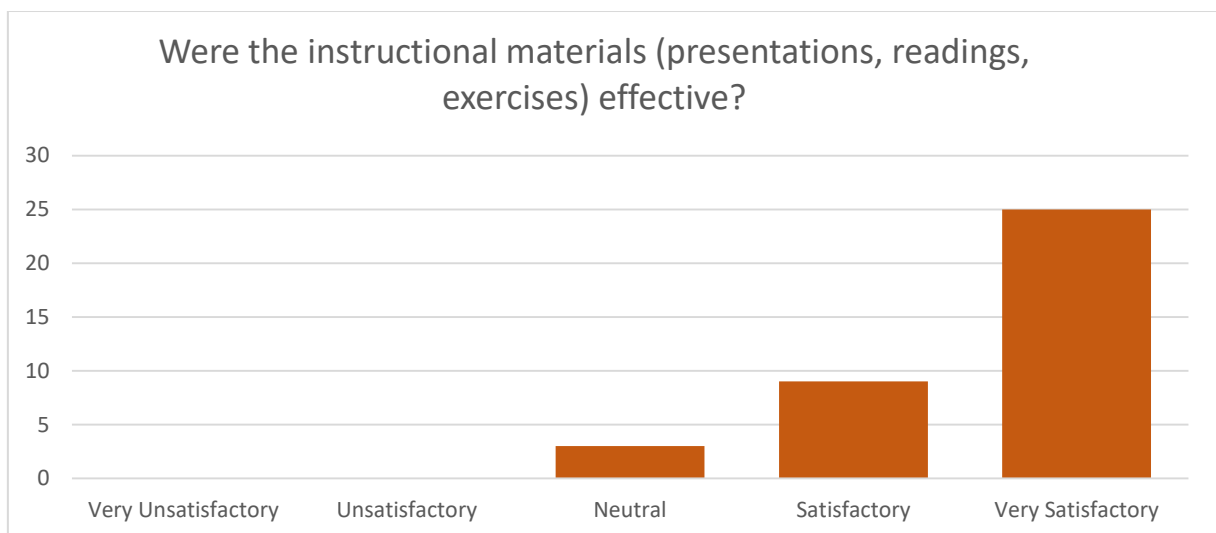
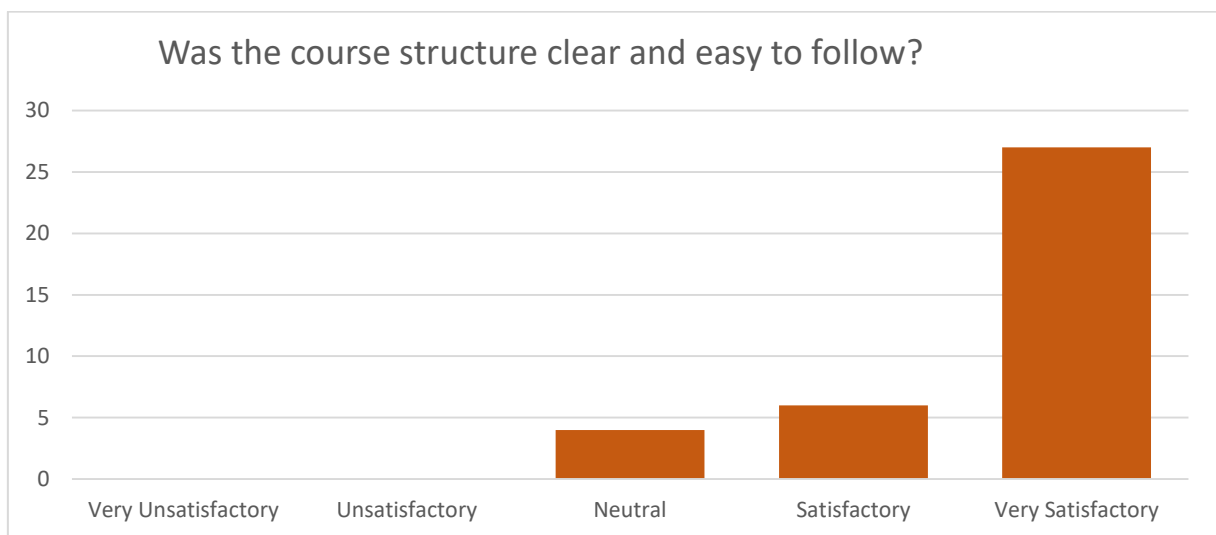
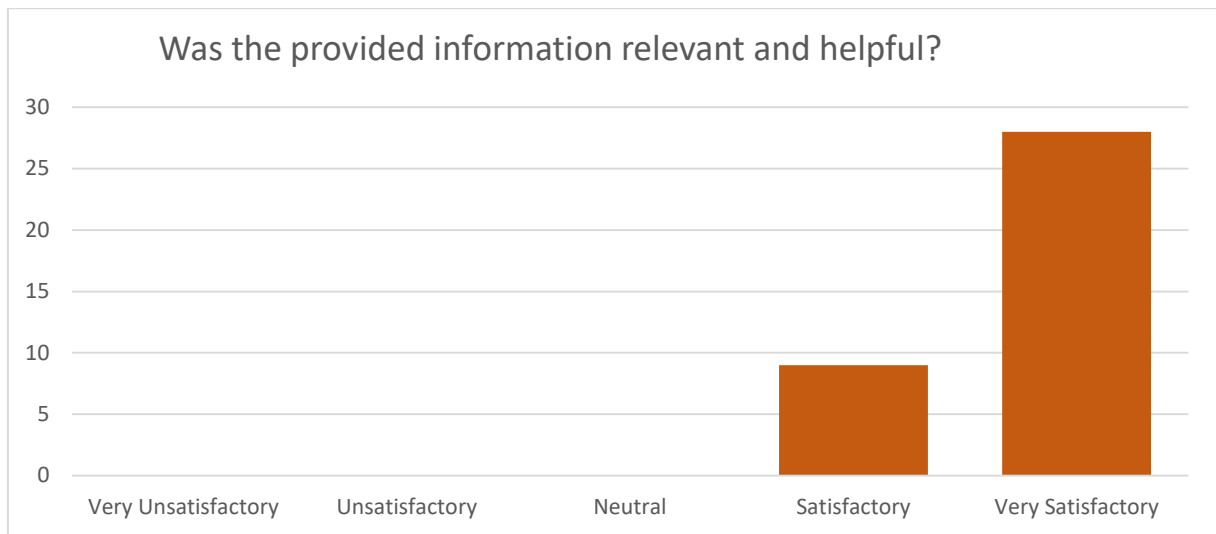
Were the duration and schedule of the course suitable for your needs?



How would you rate the convenience of the facilities and logistics in general?

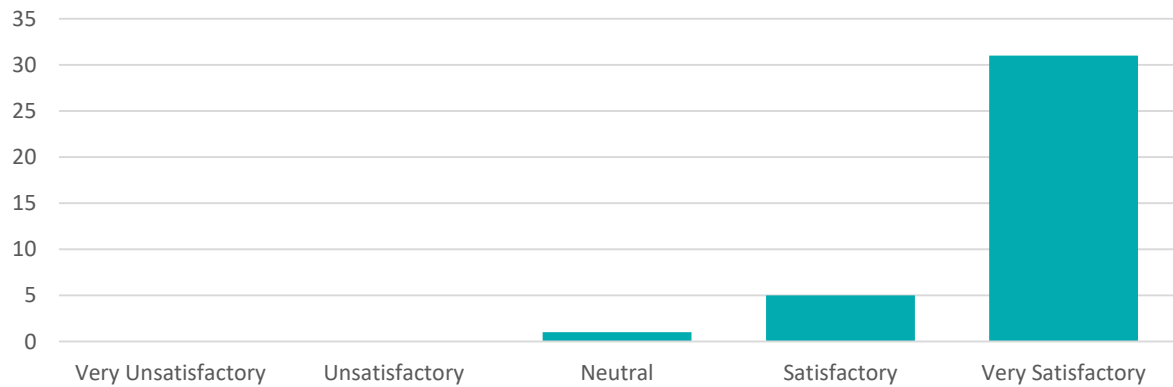


Quality of Content

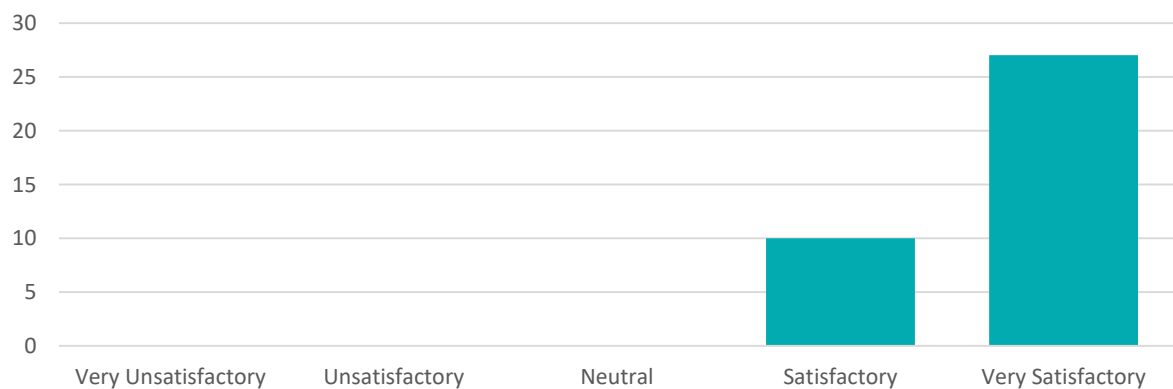


Instructor Performance

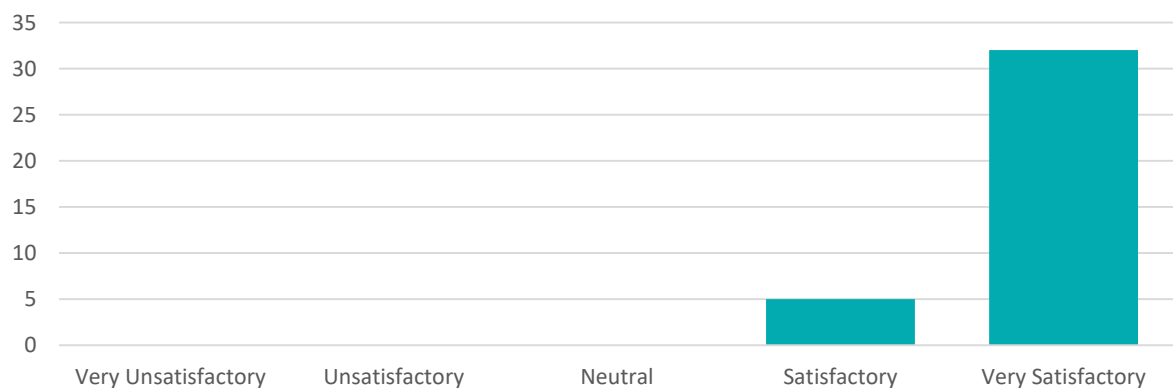
How would you rate the instructors' ability to convey information clearly?



How would you rate the availability of staff to address issues and provide support?

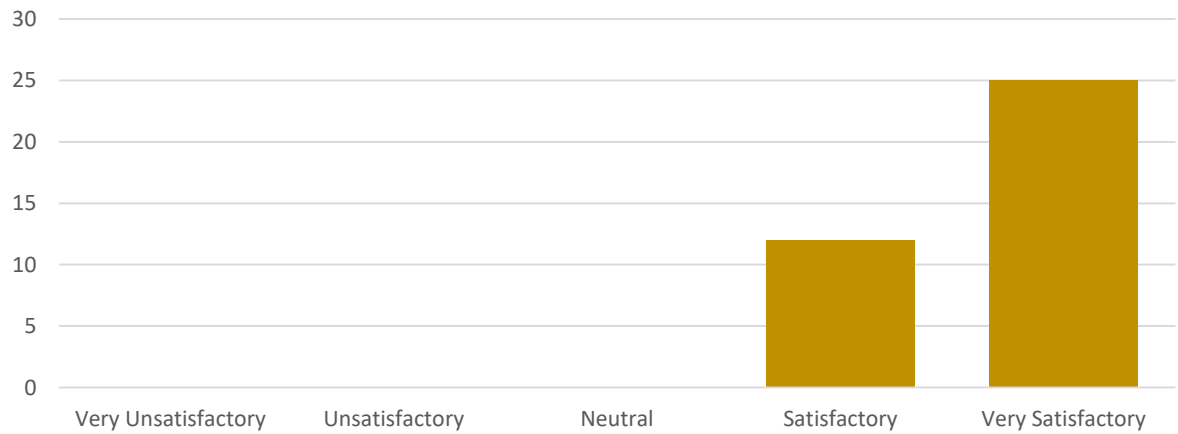


Did the instructors demonstrate a Satisfactory understanding of the subject?

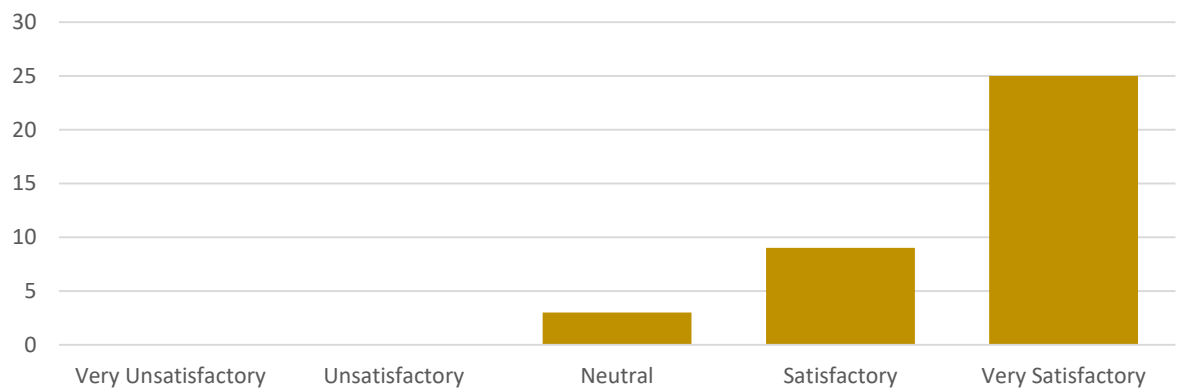


Participant Support

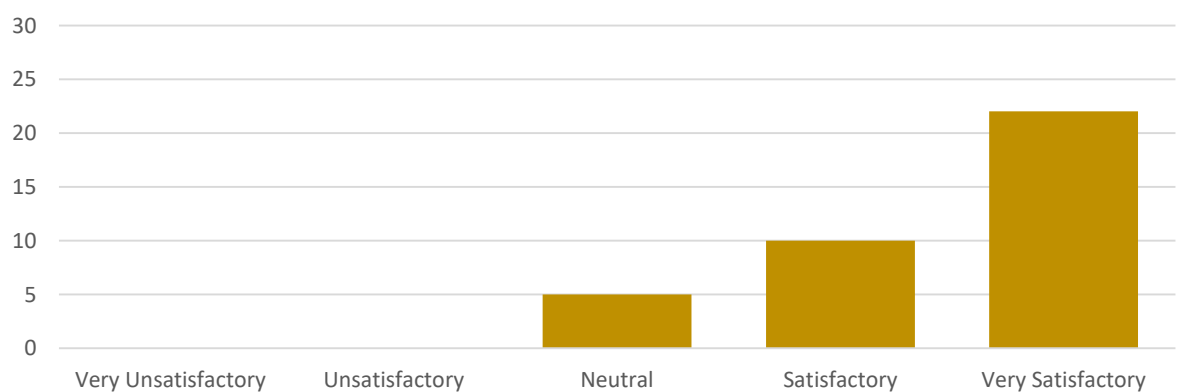
Was communication with administrative staff effective?



Were the instructional materials (presentations, readings, exercises) effective?



Did you receive constructive feedback on your performance in the course?





For more information, visit the web page: <https://sirgas.ipgh.org/escuela-geoide/>