

Studying Geoinformatics

UNIGIS professional

tailored to your needs
supported by tutors
study at home
modular
applied
online

UNIGIS Salzburg
EDUCATING GIS PROFESSIONALS WORLDWIDE



Welcome!

Academic education is indispensable in domains that are as dynamic as Geoinformatics. Conceptual foundations develop together with the fast evolving technologies. Life-long learning thus is an opportunity as much as it is a necessity.

UNIGIS is designed as an online academic program that is delivered to GI-professionals:

- to provide a solid, conceptual foundation for the acquired professional experience,
- to settle into an attractive sector of growing industry,
- to balance the study program with career and family,
- to study at the prestigious Department of Geoinformatics – Z_GIS at the University of Salzburg, and
- to earn an academic Degree as formal qualification.

Applying for a UNIGIS distance-learning program needs careful consideration. However, if you decide for this path of your personal and professional future, we assure our full engagement and long-term experience to support you towards this aim!

The study program **UNIGIS professional** offers an application-oriented foundation for your career.

Assoc. Prof. Dr. Gudrun Wallentin
Program Director

IMPRESSUM:

University of Salzburg
Department of Geoinformatics - Z_GIS
Schillerstraße 30, Bauteil 12, 2.Stock
A-5020 Salzburg

E-Mail: unigis.office@plus.ac.at
> www.unigis.at/en

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UNIGIS in a nutshell

With UNIGIS, the University of Salzburg offers internationally recognised postgraduate qualifications in Geoinformatics. UNIGIS study programs are designed as academic education programs for working professionals with flexible and innovative forms of distance learning.

UNIGIS started in 1993 with the vision of offering distance learning programs in Geographical Information Systems and Science to professionals worldwide. The University of Salzburg is a founding member of the UNIGIS network that has now grown to over 15 universities on 6 continents.

Our students benefit from our Department's international orientation and renowned experience as competence centre in Geoinformatics. Two programs are offered in German and English language: UNIGIS professional and UNIGIS MSc.

UNIGIS professional

(1 year)

for those, who are eager to get a comprehensive overview of the methods and tools in Geographic Information Technologies.

Details: > www.unigis.at/en/professional

UNIGIS MSc

(2 years)

for those, who want to get a sound foundation in Geoinformatics and aim at a degree to advance their career.

Details: > www.unigis.at/en/msc

Both study programs provide students with a sound conceptual basis and a comprehensive set of application-oriented competences in geoinformatics. These competencies have proven to be indispensable qualifications in many domains.

UNIGIS is designed as an online, distance-learning study format to facilitate self-paced learning. This enables UNIGIS students to study next to the obligations in their professional or private lives. UNIGIS participants study from home or from their workplace, communicate with their lecturers and peers through digital channels and build self-organised learning groups. Graduates join more than 5,000 alumni, who already today excel as leaders and experts in institutions and companies worldwide.

Studying at the University of Salzburg

The UNIGIS programs are offered by the Department of Geoinformatics - Z_GIS, University of Salzburg. Z_GIS is an interdisciplinary Centre of Competence for Geoinformatics. Our research is centred along seven research areas, where methodological excellency in the conceptualisation of spatial thinking is integrated with domain knowledge in addressing today's complex problems.

Besides its excellency in research, Z_GIS is recognised as a hub for graduate education in Geoinformatics with a distinct international orientation. It develops geospatial competences across disciplines, offering graduate study programs in residential as well as distance learning modes. A global network of partners from academia and industry serves as a strong platform for joint research and exchange of students and faculty.

Studying UNIGIS Salzburg over distance offers:

- Application of current GIS software
- Flexible time management within the given modular structure
- Self-paced learning to meet your individual needs and interests
- Dedicated online learning materials on the Moodle eLearning platform with a mix of multiple learning media, including scripts, worked examples, hands-on exercises, tutorials or videos
- Maximum compatibility with your job, as there are no obligatory residential phases
- Intensive tutoring and supervision by the UNIGIS team
- Frequent interaction with lecturers in discussion fora
- Possibilities to self-organise and exchange experiences with peers
- Highly competent lecturers from research and industry
- Embedded in the Club UNIGIS, the wider community of UNIGIS students and alumni

The UNIGIS professional study program

UNIGIS professional is an application-oriented study program in Geographic Information Systems. It is designed for persons who already have some experience with GIS software and/or those who have some background in a spatial discipline. It offers a sound methodological and application-oriented background in Geoinformatics.

In the core modules, students get skilled in the acquisition, modelling, analysis and visualisation of geospatial data as well as process-automation of GI-workflows. Learning materials are based on methodological concepts that will outlast dynamic technological product cycles. However, the UNIGIS professional program is clearly focussed on the application-side of Geoinformatics. Examples and exercises are at the centre of the learning experience. Multiple GIS software packages and related geospatial technology and tools will be used.

Graduates from the UNIGIS professional program will be awarded with the **Academic Certificate in Geographical Information Systems**.

UNIGIS professional is structured into 7 core modules and the Electives. Each module is worth 6 European credit points (ECTS), where 1 ECTS equals 25 hours student workload on average. Depending on a student's prior knowledge, individual time affordances may be significantly lower for particular subjects. Averaged over the program, UNIGIS students report a weekly workload of app. 12-15 hours.

The sequence of the obligatory core modules is predefined, where each module runs over two months:

Module 1: Introduction to Geoinformatics
 Module 2: Data modelling and data structures
 Module 3: Data sources and data acquisition
 Module 4: Geodatabase-Management
 Module 5: Geographical analysis
 Module 6: Visualisation and cartography
 Module 7: Application development
 Electives



Students communicate with the UNIGIS lecturers and the UNIGIS team via discussion fora in the Moodle eLearning platform, email, and online conferencing software. As UNIGIS is a program that can be studied fully online, these communication channels form an important part of the learning environment. Although distant, UNIGIS students are never alone!

At the program start, participants get all necessary materials and software licences that are needed for the module work. Also right at the beginning, in the online introductory workshop students meet each other and also get to know the UNIGIS Team. All the information on the study organisation is collected in the virtual UNIGIS Campus that can be revisited throughout the studies.



Admission requirements

The requirements for the admission to the UNIGIS professional program are:

1. A general entrance qualification for university / Higher education that is equivalent to the Austrian "Matura" certificate; e.g. High-School Diploma, A-level, Matriculation, Abitur. The equivalency will be checked by the program director.
2. A minimum age of 20 years.
3. English language proficiency: language level B2 or higher according to the Common European Framework (CEF), or equivalent qualifications.

The Program Director decides on the admission to the study program considering available study places, the application documents and the orientation interview.

Language

English will be used throughout the program in the materials and the communication channels. Besides the English-language programs, the University of Salzburg also offers UNIGIS programs in German and in Spanish language. If interested, ask the UNIGIS office for more information!

Open for students from many disciplines, e.g.:

Agronomy – Environmental management – Architecture – Archeology – Geology – Economics – Forestry – Geography – Geophysics – Informatics – Cartography – Hydrology – Meteorology – Natural Hazard Mitigation – Criminology – Ecology – Emergency Response Management – Spatial and Landscape Planning – Regional Sciences – Biology – Geodesy and Surveying – Zoology – Geomatics – Civil Engineering – Business Administration – Sociology

Alumni work for example in the following companies or institutions:

European Commission, Joint Research Centre – International Committee for Red Cross – Dynafrica IT Solutions – Earth Observation, Singapore – Electricity Authority, Nepal – German Corporation for International Cooperation, Tajikistan – United Nations, Nairobi – HERE Technologies – European Food Safety Authority – WWF, Bhutan – Ministry for the Environment, Sustainable Development and Climate Change, Malta – Bristol Zoological Society, UK – Postdoctoral researcher, Ecole normale supérieure Paris-Saclay, France – Ministry for Agriculture and Rural Development, South Africa – Reibo Software Consulting, Belgium – Forest Research Institute Ticino, Switzerland – TDB Consultants Inc., Canada – Mesh urban planning and design Ltd., Australia

Study performance: assignments and exams

In the UNIGIS curriculum, a student's performance is assessed based on a set of assignments. An assignment is a homework with personalised tasks that a student needs to work on. After the completion of a module, a solution document is compiled and delivered.

Typical types of assignments are applied tasks that a student needs to work on:

- Geoprocessing of spatial data with GIS-Software. Besides the results, the steps of the workflow need to be documented.
- Delivery of specific geospatial products, like maps, analysis reports, graphs, etc.
- Reading assignments and essay-based discussions on a topic.

At the end of each module, the students upload their solution documents to the eLearning platform. From here they are passed on to the lecturer, who grades students within 3 weeks after the deadline. Grades range between Excellent (grade 1) and Failed (grade 5) according to the Austrian grading schema. In addition to the grade a student gets detailed verbal feedback. The overall performance assessment in the final certificate averages the module grades.

Besides the assignments, a module always also offers exercises that help to prepare for the assignments, or offer the possibility to delve deeper into the one or other aspect. Exercises can be openly discussed with peer students and the lecturer. These activities are optional and they are not part of the performance assessment.

Throughout the study, there are no written exams. Thus it is not necessary to travel to Salzburg. Like any exam, assignments adhere to the terms and regulations for University examination standards. Thus, a student has the right to repeat the exam by means of a second set of assignments. After positive assessment of all core modules and the Electives, the University of Salzburg will issue the "Academic Certificate in Geographical Information Systems".

The quality of our materials and their didactic presentation is subject to continuous monitoring. UNIGIS quality management operates at multiple levels. After each module, students are asked to fill in an evaluation form for anonymous feedback. We highly appreciate the high response rate that greatly helps in the continuous update of learning materials in the highly dynamic field of geoinformatics.



Study support – distant, but always connected

To pursue an academic study program via distance learning asks the support from many sides: it is important that friends and family are there to support you. Also the value in an exchange with peer students or in small learning groups cannot be underestimated.

From the UNIGIS team you can expect the following support:

- **Lecturers** offer help in content-related questions in the context of the study materials, exercises and assignments.
- Our **UNIGIS faculty** and **tutor** team guide you through the study program. They monitor your state, give advice and guide you smoothly through your study. There is no organisational or technical issue, in which you cannot approach our team.
- The **UNIGIS office** is responsible for administrative

workflows like tuition fees, enrolment, issuing of certificates and degrees.

- The „**ClubUNIGIS**“ is the community of UNIGIS students and graduates. It will continue to be an active communication platform also after completion of your studies. This is, how students get connected with alumni from the very first module. Make use of the extensive experience of the ClubUNIGIS network!

In UNIGIS, communication takes place in discussion fora, emails, and online meetings. Right from the first module, there will be an intensive relation between students, with the lecturer and the UNIGIS team. In our experience, active communication is one of the main success factors. It not only supports where help is needed, but also refuels personal motivation. The more actively you participate in the communication, the more you will benefit yourself - and with you the entire student cohort of your intake.

None of your questions shall remain un-answered.

Don't be shy to ask, there are no "stupid" questions!

Your study progress matters to us.

Your UNIGIS Team

Assoc. Prof. Dr. Gudrun Wallentin
gudrun.wallentin@plus.ac.at
UNIGIS Program Director
Director of Studies



Regina Hatheier Stampfl, MSc
regina.hatheier-stampfl@plus.ac.at
Head of UNIGIS Office



Mag. Judith Grubinger, BA
judith.grubinger@plus.ac.at
UNIGIS Faculty



Danijela Ristic
danijela.ristic@plus.ac.at
UNIGIS Office



Anna Karnassioti
anna.karnassioti@plus.ac.at
UNIGIS Tutor

**The UNIGIS professional Team
is looking forward to
guide you through your studies
and to provide advice and support whenever needed!**



Dr. Martin Loidl
martin.loidl@plus.ac.at
Coordinator of optional modules



Define your individual learning pathway

The UNIGIS professional program is structured into 7 core modules as well as the Electives. The program starts twice a year, on March 1st and October 1st. In total, UNIGIS professional takes 14 months to finish. An extension to up to 18 months study duration is possible free-of charge.

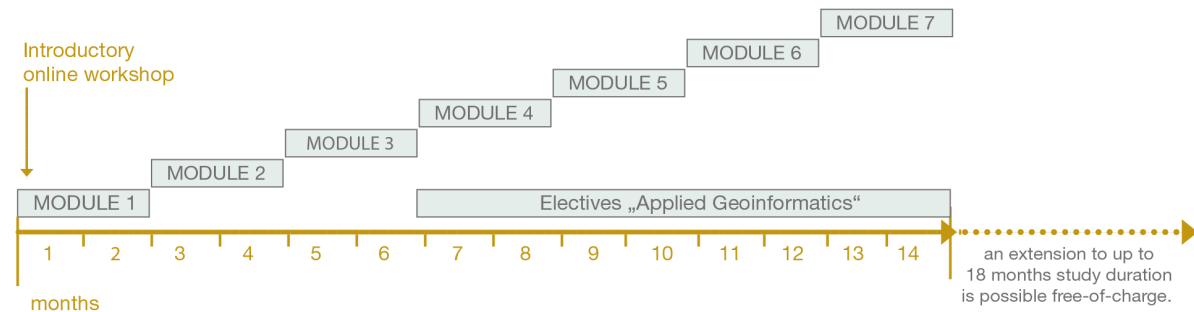
The schedule of the **core modules** follows a predefined sequence. Deviations thereof are possible, but need to be agreed with the UNIGIS team. Altogether, each module takes 2 months. Within these two months, time management is fully flexible. The repeating structure of modules will help you with this task. No matter, if you are a late-night worker or prefer to get up early: you are free to work according to your own pace.

The **Electives** cover a total amount of 18 ECTS-credits. This provides the opportunity, to forge your own speciality and learning pathway.

Download the current curriculum here:

> www.unigis.at/en/unigis-prof

UNIGIS professional Study Schedule





CORE MODULE 1: Introduction to Geoinformatics

This introductory module has a special position as a first study component of the curriculum. It provides orientation and sets the frame for working with the subsequent modules. Specifically, it supports the development of a personal style working with the distance-learning materials. In addition to these objectives regarding the study format, the following domain-related content is offered:

- Terminology and functional characteristics of geographical information systems.
- Typical applications of geographical information processing.
- Current trends in Geoinformatics.
- Overview of secondary information resources for GIS in the sense of life-long learning.
- Practical training to use professional GIS software.
- Competent use of coordinate systems and projections in the practical work of GIS.

CORE MODULE 2: Data Modelling and Data Structures

This module provides a profound overview of common data structures and models of geographic information systems. It explores how the real world around us can be mapped in all its complexity clearly with comprehensible data models and structures. Specific module contents include:

- Modelling spatial information.
- Spatial models – data models – data structures.
- Vector model.
- Raster models (grid).
- Representation of surfaces.
- Multidimensional spatial data models.
- Object-oriented data models.
- Data modelling with UML.
- Introduction to mark-up languages (XML, GML).



CORE MODULE 3: Data Sources and Acquisition

The third module is dedicated to the process of collecting real-world information. It gives an overview of the diversity of primary and secondary acquisition methods. It thereby creates insight in the genesis and the related suitability-for-use of spatial data for specific use cases. It makes aware about digital resources, and introduces standards-compliant documentation. It will also focus on the management of GI projects. Specific module contents include:

- Identifying adequate data sources for specific applications and user needs.
- National and global spatial data sources, OGD, SDI, INSPIRE.
- Primary collection methods: surveying, photogrammetry, laser scanning, GPS, remote sensing.
- Secondary acquisition methods: scanning, digitising, vectorising.
- Raster to vector conversion, indirect position data, geocoding.
- Data transfer, norms and standards, format transformations.
- Metadata, metadata standards.
- Data quality and cost.
- Legal aspects, copyright and copyleft, open licenses.

CORE MODULE 4: Geodatabase Management

In this module, the theoretical foundations of conventional geodatabase management systems are introduced. Building on the lesson on data models, students will use Entity-Relationship modelling and its formal notation to structure their data. With help of the Structured Query Language, students build and query their own databases. Finally, data management of database with GeoDBMS tools in general and spatial databases specifically is discussed. Specific module content includes:

- Architecture of database management systems.
- Relational data modelling, ER, ER notation.
- Normalisation.
- Solid basics of the SQL query language as a universal language for data definition, data control and data management.
- Glossary of terms relating to geographic data base systems.
- Spatial models in DBMS.
- Spatial indexing.



CORE MODULE 5: Geographical Analysis

Spatial analysis methods are a central feature of all geographic information systems. This core area of Geoinformatics aims at a transfer of domain issues towards an adequate use of analytical methods and tools of the Geoinformatics, by adequate problem structuring and conceptualisation. This module introduces the fundamental methods and techniques of geographical analysis. Specific module contents include:

- Horizontal techniques (neighbourhood analysis, distance functions, filter, interpolation, diffusion).
- Vertical multi-thematic integration (intersection, assessment, multi-criteria method).
- Grid analysis and map Algebra: local, focal and zonal operators.
- Cost surfaces.
- Terrain analysis (slope, exposure, exposure, visibility).
- Multivariate classification and regionalisation.
- Understanding of the formation of dynamic models and simulation.
- Route optimisation and allocation in networks.

CORE MODULE 6: Visualisation and Cartography

Knowledge on the visual communication of spatial issues is essential, because virtually every GI professional actively design maps. This module aims at professionals from different domains to take advantage of cartographic data processing for their respective tasks. Specific module contents related to conventional as well as digital publication forms (Web mapping, mobile mapping) include:

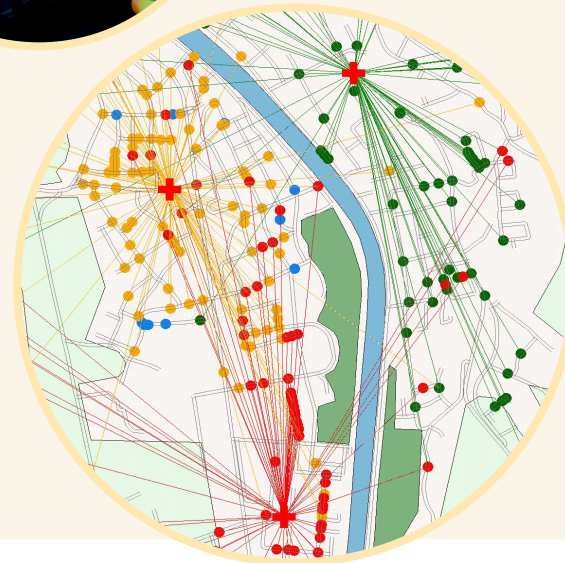
- Cartographic application fields and paradigms.
- Cartographic design process, generalisation and classification.
- Perception of forms and visual variables, Colour models and colour use, consideration of colour vision deficiency.
- Development of map annotation, map symbols and interaction.
- Thematic maps, diagrams and diagram maps.
- Map design and layout.
- Reproduction and digital devices and output formats.
- 2.5D/3D visualisation.
- Web mapping technologies and APIs.
- Dynamic visualisation.



CORE MODULE 7: Application Development

This module serves as an introduction to developing applications in the geospatial domain. For GI-professionals it is useful to know how to automate workflows and tasks outside an existing software products. That is when programming skills get in handy. Specific module contents include:

- Programming Paradigms and Languages
- Basic Programming Concepts
- Python Scripting
- Working with IDEs (Visual Studio Code)
- Introduction to Git and GitHub
- Reproducible workflows with Jupyter Notebooks
- Design of applications with help of UML notations
- Good coding practice, including use of patterns, refactoring, and testing
- System architectures





Electives „Applied Geoinformatics“

Elective Subjects advance and/or complement skills and knowledge acquired on UNIGIS core modules for specialised topics. In the Electives, a total of 18 ECTS are to be selected.

There are various ways to cover the Electives. Most importantly, UNIGIS offers a variety of optional modules that cover a broad range of conceptual and application-oriented topics in Geoinformatics. However, students can get credits for a range of other courses and achievements, including documented project work, successful participation in a Summer School, scientific publications, select online training courses or MOOCs.

A coherent subset of at least 12 ECTS within the Elective Subjects can be bundled together as individual specialisation. The specialisation will be indicated in the Final Certificate and thus supports individual profiles.

Before signing up to optional courses, we recommend to discuss individual preferences with the faculty to get the most out of the Electives for yourself.

The following subjects are currently available as optional modules:

- Automated GIS Workflows with QGIS and Python
- Enterprise GIS
- Environmental Monitoring
- EuroGIS – The European Dimension of GIS
- Remote Sensing
- Spatial Simulation
- Application Development using Javascript
- Application Development using R
- LiDAR Remote Sensing and Applications

For detailed information on module contents, see:

> www.unigis.at/en/optional-modules



Tuition fees

The tuition fee amounts to 5,900.— EUR. It covers the costs of your study and includes registration, tuition, supervision, examination and graduation. Moreover, it covers your obligatory membership in the Austrian Student Union. Payment is due after acceptance. The full amount has to be transferred to the University two weeks before the program starts.

Any bank transfer charges must be covered by the sender. Credit Cards are accepted. It is not possible to split the payment into installments. Once the program has started, no reimbursements are possible.

The (GIS-)software that is used in the core modules is provided free of charge during the entire duration of your studies, limited to study purposes. Any (GIS-)Software that is used in optional modules is free, at least for the duration of the module.

Study extension

An extension of up to 18 months is free of charge. In case a student exceeds the maximum program duration, no further university services can be consumed, including tuition, supervision or examination. However, students can apply for a further extension phase, for which extension fees will apply.

Further costs may arise for

- optional travels to Salzburg, e.g. to the ClubUNIGIS meeting at the annual conference.
- any optional summer schools or training courses with your Electives.
- costs for the broadband internet access and data download.
- the hardware for your personal workplace.

Learning materials

Learning materials are developed by domain experts, are continuously updated and carefully designed. The scripts, exercises and tutorials support students in acquiring the conceptual background and methodological skills to solve complex task in spatial data handling and analysis. Scripts are provided in BookDown Format as interactive web-books. For offline use, the scripts can also be downloaded as printable pdf or an eBook format.

The UNIGIS eLearning platform on Moodle provides a single access point to all learning materials, assignments, software, discussion fora and the organisational guidelines. This way, materials can be easily updated and students are always provided with the latest version.

Thanks to our software partners, students can gain ex-

perience with the main GIS software packages in Geoinformatics and Remote Sensing (mainly student licences), for example:

- ArcGIS Pro (ESRI)
- ERDAS Imagine (Hexagon)
- FME (Safe Software)
- Quantum GIS (open source)
- PostGIS/PostgreSQL (open source)

Beyond that, students have the possibility to explore further software products. Test licences can be provided for e.g. Geomedia (Hexagon), Smallworld (GE Network Solutions) or AutoDesk Map 3D (Autodesk). Moreover, materials in optional modules cover several open source applications, e.g. R or GAMA.





What is needed for your workplace

In order to study Geoinformatics from home, you need your own workplace, most importantly a reasonably new computer on which you have installation rights.

Hardware

Here are the specifications for a computer that is adequate as UNIGIS workplace. The required hardware specs are mainly imposed by the GIS software.

Minimum requirements (recommended)

- Hyperthreaded double core CPU (4 cores)
- 8 GB RAM (16 GB)
- 40 GB free disk space (40 GB on SSD)
- Graphics card: DirectX 11, OpenGL 4.3 (Open GL 4.5)
- CPU-speed: 3 GHz
- Display: min. 19"
- Broadband Internet-Access
- Printer
- Mic and Speakers / Headset and Webcam

If you plan to buy a (new) computer, we are happy to advise!

No specific software needed

GIS-Software: GIS software is provided. Thanks to our cooperation with ESRI, we can offer a full licence for ArcGIS Pro including all extensions for the duration of your studies.

Operating System:

The following Operating Systems are supported:

- Windows 8.1 Pro and Enterprise (64 Bit)
- Windows 10 Home, Pro and Enterprise (64 Bit)
- Windows 11 Home, Pro and Enterprise (64 Bit)

There is no specific support for Mac or Linux. However, students have successfully used Mac computers for their UNIGIS studies.

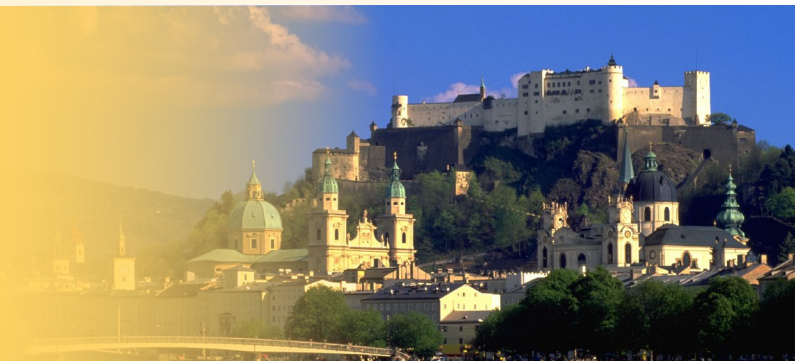
Text processing software: While we recommend MS-Word for Windows, you can use any alternative software (e.g. OpenOffice) that offers the possibility to generate a pdf.

Browser: Any common internet browser like Mozilla Firefox, Google Chrome oder Microsoft Edge in a recent version. Often it is recommendable to have two alternatives installed.

Communication: Student email accounts will be deleted after graduation, so we recommend using your own email account. The main communication platform is the eLearning platform "Moodle".

What else can UNIGIS offer?

For all UNIGIS students



GI-Software

In case you have an interest in a specific GIS-related software that is not covered in the modules, it is worthwhile to enquire in the UNIGIS office. Due to our activities in research and teaching, we may well have a test licence available.

Software training

UNIGIS students can access the majority of courses that are offered by the ESRI Academy Plattform free of charge (> training.esri.com).

University library

The university offers (almost) all of its journals and some text books in electronic format. As student of the University of Salzburg you have full access to these resources.

ClubUNIGIS

UNIGIS students have the exclusive possibility to continue their life-long learning pathway also after graduation.

Alumni have the life-long right to sign up for an optional module.

The ClubUNIGIS is a network of approximately 2000 students and alumni, who are or have been enrolled to one of the UNIGIS Salzburg programs. ClubUNIGIS members are connected through several channels like LinkedIn, and the newsletter. Be an active part of the community: in today's networked society it is a key asset to be well linked to the professional community! Moreover, ClubUNIGIS Netzwerk offers a number of discounts and services, e.g. the exclusive right to sign up for optional modules at cost price and a special rate at the annual GI_Salzburg conference.

Find out more about the benefits of ClubUNIGIS on the website:

> www.unigis.at/en/clubUNIGIS

Contact

Let's get into contact!

Paris Lodron Universität Salzburg
Department of Geoinformatics - Z_GIS
UNIGIS
Schillerstraße 30, Bauteil 12, 2.Stock
A-5020 Salzburg
AUSTRIA

www.unigis.at/en
E-Mail: unigis.office@plus.ac.at
Tel.: 0043 / (0)662 / 8044 - 7522
Fax: 0043 / (0)662 / 8044 - 182

For any open question, please do not hesitate to get into touch per email or phone.

Patric Loydell

I have recently completed my Professional Diploma from UNIGIS Salzburg, and I now want to enrol in the UNIGIS MSc program. Whilst doing my Professional Diploma, it has allowed for me to expand my working knowledge of GIS as well as teaching me many new disciplines within the field of GIS. The manner in which the course is structured allowed for me to continue with my full time job whilst being able to keep my studies on track. When I encountered any issues in my studies, they were tended to by the UNIGIS Salzburg team in a very quick and professional manner. I would recommend UNIGIS to anybody who is interested in the field of GIS.

Mohammed Salim AL Sulaimani

The impression I got about the UNIGIS Program was exceeding my expectation. It involves different GIS aspects and applications. I have learnt so much from all constructive input and guidance through each lesson of each module. I have spent an enjoyable and non-forgettable time studying within UNIGIS. I would like to express my gratitude to both professional administrative and academic teams for the intensive support that they have provided.

Jim O'Leary

I have put in an uncountable number of hours in the past two years working on my courses in the UNIGIS MSc program, but I can say in truth that I have enjoyed every one of those hours. I have learned a tremendous amount about the deeper subjects in GIS, which was my goal when I entered the program.

Ivo Planötscher

My UNIGIS knowledge contributed significantly to the fact that I was able to found a private IT company, which is still successfully operating on the European IT market today. Looking back I can say without doubt that the UNIGIS courses are designed in such a way that all theoretical approaches are conveyed to the students as practically as possible, so that they are able to exercise the profession of a GIS analyst in the best possible and immediate way in their daily work.

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