



UNIGIS Amsterdam

Postgraduate Certificate, Diploma &
Master of Science Programme in
Geographical Information Sciences

**Study Guide Part I – General information
(2009-2010)**

vrije Universiteit *amsterdam*



Educating GIS Professionals Worldwide

This Study Guide provides the information needed to successfully study at UNIGIS. Every student is advised to read this document carefully and keep it for reference.

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Colofon

UNIGIS Amsterdam*

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Study Guide 2009-2010

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* This Master's programme is officially registered under the name Geographical Information Sciences (crohocode 75040)

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General information for Students

1.1. UNIGIS at the Vrije Universiteit Amsterdam

1.1.1. *UNIGIS: an international network of collaborating universities*

UNIGIS was founded in 1990. The original idea for the UNIGIS distance-learning programme was developed at the University of Salford in the United Kingdom. Its first phase of development was funded by a grant from the University Funding Council. At an early stage, however, it was realised that collaboration would be necessary. The skills and knowledge needed to develop a comprehensive GIS course and optimally support students needed resources from more than one university. GIS specialists in each institution are too few to support independently the administrative and academic inputs to a complete course, but together they represent a strong team with wide-ranging and complementary skills. As a result, a joint course has been set up in order to provide the breadth of experience and knowledge necessary to run a course that has a full and logical structure. Subsequently, a partnership was formed by five universities, now the founding members:

- The University of Huddersfield, Department of Geographical and Environmental Sciences, United Kingdom
- The Manchester Metropolitan University, Department of Environmental and Geographical Studies, United Kingdom
- The University of Salford, Department of Geography, United Kingdom
- The Universität Salzburg, Department of Geography, Austria
- Vrije Universiteit Amsterdam, Department of Regional Economics, the Netherlands.

Not long afterwards other universities joined the UNIGIS network. At present, the UNIGIS network includes 15 universities in fourteen countries and is still growing. The universities that collaborate in the UNIGIS network are listed at www.unigis.net. Each site works independently, but strong collaboration exists in the development of course materials and student support. The network also provides opportunities for organising international summer and winter schools, making agreements with software vendors, obtaining European accreditation, etc.

At June 28, 2002 the UNIGIS International Association was officially established to create a legal framework for the activities of the network. According to the statutes, the aim of the association is to promote education and interest in GIS at the highest level, both in national and international context, and to represent in the broadest sense of the word the interests of its members in that area. Each two years a new International Course Board is chosen. Currently the International Course Board consists of:

- Henk Scholten (UNIGIS Amsterdam): chairman
- Irene Compte (UNIGIS Girona): secretary
- Bela Marcus (UNIGIS West-Hungary): treasurer
- Joseph Strobl (UNIGIS Salzburg): member, international partnerships
- David Lambrick (UNIGIS Manchester): member, quality assurance and new memberships.
- Paul van Helden (UNIGIS Pretoria): member, all remaining matters

Each UNIGIS institution has its own curriculum committee to monitor the operation of the local organisation as it affects that institution and as each UNIGIS institution has to comply with national rules and regulations. The curriculum committee is responsible for

the day-to-day operation of the course and carries out monitoring and evaluation procedures within the framework set by the International Course Board.

The UNIGIS International network universities collaborate to deliver innovative courses presented to professional standards. These meet the needs of industry and commerce and provide an understanding of the conceptual, technical and organisational aspects of GIS. Industry standard software is used to give appropriate practical experience. The UNIGIS International Association provides the broad skills and knowledge essential to deliver a comprehensive course.

1.1.2. UNIGIS Amsterdam and the SPINlab

In January 1990 the Vrije Universiteit Amsterdam established a chair in Spatial Computer Science. This chair was allocated to the Department of Spatial Economics at the Faculty of Economics and Business Administration. The GIS-group that was formed as a result of the establishment of the chair has been very successful in delivering (PhD) research and providing education for students of the Department. In 1993 UNIGIS Amsterdam was established by the GIS group.

In the year 2000 the GIS activities at the Vrije Universiteit were expanded with the establishment of the SPINlab (SPatial INformation laboratory). The SPINlab is set up as an independent centre supported by the Faculty of Economics and Business Administration and the Faculty of Earth and Life Sciences. The lab will assist the activities of the funding organizations by providing technical expertise, research and education competences, a web-enabled spatial infrastructure, data resources, and a helpdesk. The lab will also initiate innovative research and education on spatial information subjects. Since the foundation of the SPINlab, UNIGIS Amsterdam has become the most important educational activity of the SPINlab.

Until 2005, the UNIGIS curriculum was only offered in the form of a three-year part-time postgraduate course in GIS through distance-learning, specifically targeted at working people. From 2006 onwards however, UNIGIS expands her educational courses by offering a one-year full-time Master of Science course in GIS for regular students.

The SPINlab co-operates closely with the GIS-group at the Department of Spatial Economics and several groups at the Faculty of Earth and Life Sciences, in particular with the SPACE group at the Institute for Environmental Sciences (IVM). The SPINlab focuses on three main activities:

- Education, of which UNIGIS is the main activity;
- Research, and
- Helpdesk and service desk for GIS software and hardware.

The research topics of the SPINlab currently cover spatial interaction modelling, 3D spatial analysis and visualisation, spatial decision making, and location based services, among others. The laboratory stimulates industry-academia initiatives and is Centre of Excellence for Oracle Spatial.

For the above-mentioned GIS activities the SPINlab is equipped with a powerful NT webserver, PCs, digitisers and colour plotters. Proprietary GIS Software includes ArcInfo 9.x, ArcView, ArcIMS, Geomedia Pro, GeoKey, Mapinfo, Idrisi and Oracle Spatial 10i.

At the moment the SPINlab activities are sponsored by the following organisations: Intergraph, ESRI Netherlands, the Environmental Assessment Agency (MNP), Hewlett Packard, Oracle, and Geodan b.v. For more information on the SPINlab see www.spinlab.vu.nl.

The location of GIS within several departments at the Vrije Universiteit emphasizes the interdisciplinary character of GIS. Co-ordination by the SPINlab means that several resources (people, hardware, software) are available to all users of GIS. UNIGIS is organised by the SPINlab in close co-operation with the Department of Regional Economics.

1.2. Studying at UNIGIS & Student Facilities

1.2.1. Addresses

Correspondence address UNIGIS Amsterdam Office¹:

UNIGIS Amsterdam
Vrije Universiteit
FEWEB/RE
De Boelelaan 1105
1081 HV Amsterdam - The Netherlands

Email: info@unigis.nl
Website: www.unigis.nl
Tel: +31 20 598 6099
Fax: +31 20 598 6004 (attn. UNIGIS)

Visiting address UNIGIS Amsterdam Office:

Department of Spatial Economics
Main Building, room 4A-40, 4th floor

Correspondence address of the SPINlab²:

Vrije Universiteit
IVM - SPINlab
De Boelelaan 1087
1081 HV Amsterdam - The Netherlands

Email: spinlab@ivm.vu.nl
Website: www.spinlab.vu.nl
Tel: +31 20 598 9569
Fax: +31 20 598 9553 (attn. SPINlab)

Visiting addresses of the SPINlab:

Vrije Universiteit - IVM
Math & Physics building, room A-621 (6th floor, hall A)

Department of Spatial Economics
Main Building, rooms 4A-40 and 4A-42, 4th floor

For general information about the Vrije Universiteit and its facilities, please see www.vu.nl. For the addresses of all collaborating institutes see: www.unigis.net.

¹ For all UNIGIS matters (assignments, emails, registrations, etc.), please only use the UNIGIS addresses as mentioned above.

² For all SPINlab related matters, please only use the SPINlab addresses as mentioned above.

1.2.2. *Study material*

A range of learning strategies is employed with an emphasis on student centred learning. These include study pack notes, continuous and periodic self assessed exercises, tutor assessed work, computer based exercises, contact with tutors through a help-line and tutorials and workshops, and access to academic literature.

Modules, which can be downloaded from Internet, will contain module notes supported by directed reading and references to develop independent learning skills. Students will be encouraged to research topics beyond the scope of any prescribed references but the packs provide all necessary material for the module.

Workshop I will give an introduction to the study materials and guide the student through the UNIGIS website.

1.2.3. *Books and Literature*

UNIGIS has already made a selection of parts of the following book, which are related to some of the modules. You can find them when accessing the modules. Of course you can purchase the book if you wish to:

Geographic Information Systems and Science
David W. Rhind, Michael F. Goodchild & Paul A. Longley
Hardcover | John Wiley & Sons, Inc. | USA Edition | 2001
ISBN: 0471495212
Price: approximately € 50

Or

Title: Geographic Information System and Science
Author: Longley, P.A, Goodchild, M.F., Maguire, D.J. and Rhind, D.W.
Hardcover | John Wiley & Sons, Chichester, UK | 2nd Edition, 2005
ISBN: 0 471 73545 0
Price: approximately € 46

Tip: If your bookshop does not have this title, you can order it through Amazon.com, for instance.

In many cases additional literature is required for specific modules. Please refer to the specific modules for necessary books and reading material.

1.2.4. *Quality control of study material*

For the course to be successful, it is essential that the study packs are of a consistently high quality. If you have any comments on the study materials, please share them with the UNIGIS staff. Completed assessments, and other student responses, will be retained and used for module and course review purposes.

The UNIGIS course material undergoes regular quality checking within the UNIGIS International Network.

1.2.5. *Help*

Students have several possibilities to obtain help if they have a problem or do not understand something in a module.

Firstly, each module has a **module tutor**. The module tutor will send each student an email at the start of the module. The name and email address of the tutor can be found in the course material and on the UNIGIS website. If you have any questions regarding the contents of the module, you can send an *email* to the tutor. Please do not call, as not all tutors work full-time at the UNIGIS office and answers cannot always be given

instantly. The module tutor will answer as soon as possible, depending on the urgency of the question, but usually in one or two days.

Secondly, students should be aware that we have a Google Group dedicated to discussion of the concerns of students in the program. Membership is open, but you need to create a Google account. The group can be found at: http://groups.google.com/group/unigis_nl.

Thirdly, students are encouraged to develop informal **self-help networks**. Through workshops and the UNIGIS website students can meet each other and establish contacts with other students, for example through the use of email or Skype.

1.2.6. *VU Library / SPINlab book collection*

Every UNIGIS student is member of the extensive University Library of the Vrije Universiteit in Amsterdam. After registration at the Vrije Universiteit, through registration at UNIGIS, each student will receive a student card that contains a barcode for borrowing books at the library. More information on the library and the catalogue of the library can be found at www.ubvu.vu.nl.

Unfortunately, the library of the Vrije Universiteit does not have a specific GIS section. Therefore, the SPINlab has a small collection of GIS related books. These books can be borrowed as well. No overview of the collection exists, but the books can be found in the UNIGIS office.

1.2.7. *Magazines*

UNIGIS offers a free subscription to *VI Matrix* and *Geo-Informatics*. The Dutch magazine *VI Matrix* will only be sent to students living in the Netherlands. A list with students is sent once a year to the administration of these magazines by the UNIGIS office, so it may take a few months before you receive your first issue.

Also, *GIS Magazine* has a special offer for our students: subscription costs only 19 euros per year.

1.2.8. *Hardware*

To complete the course you must have:

- Unrestricted access to a PC with *Windows XP* operating system for the duration of the course. *Specifications vary according to the software adopted – see below.*
(Please note there are still issues regarding using GIS software with *Windows Vista* – refer to the vendor websites for details);
- Reliable (preferably Broadband) Internet access to e-mail and the World Wide Web.

1.2.9. *Software*

An important part of the taught course is acquiring skills in using GIS software. All our modules have exercises and assignments, many of which require you to use GIS software.

UNIGIS currently supports three GIS software products. These products give you the opportunity to use software appropriate to your needs and to your educational objectives.

ArcView 9.x (ESRI)

- Costs
Students can purchase a one year licensed copy of the ArcGIS software for €53. Last year this included a book on GIS, but ESRI has not informed us yet whether this will also be the case this year. Terms and conditions apply to the use of this software. UNIGIS students may purchase the software again at a

discounted cost if they need it in their second year when it is specifically needed for the *Programming & Modelling for GIS Unit*.

ArcGIS is a dominant desktop GIS package in the market and with its many extensions it provides a powerful suite of GIS functions. Details of this will be given upon registration.

- Hardware specifications

ArcGIS requires a PC with a CPU speed of 1.6GHz recommended or higher Intel-based microprocessor (Pentium, Xeon or Dual Core), and 1.2GB hard disk space. You will need a minimum of 1GB of RAM (2GB recommended or higher) with MSWindows 2000 or MSWindows XP operating system. An OpenGL 1.2 or higher compliant video card is required, with at least 32 MB of video memory, however 64 MB of video memory or higher is recommended. A DVD-ROM drive is also required. Internet Explorer Requirement: Some features of ArcView 9.2 require a minimum installation of Microsoft Internet Explorer Version 6.0 or 7.0. If you do not have an installation of Microsoft Internet Explorer Version 6.0/7.0, you must obtain and install it prior to installing ArcView. (Please check IE 7 Limitations if you use this version of Internet Explorer.)

Note: UNIGIS advises you to download and install the most current Service Pack for ArcGIS 9.x after you have installed the software. Our own tests show that the software then properly functions with among others IE 7.0.

- More information

The web site for ArcView is www.esri.com/arcview and for ArcGIS: www.esri.com/software/arcgis

IDRISI (Clark labs)

- Costs

IDRISI 'Andes' from Clark Laboratories is a leading raster GIS widely used in education and environmental applications. UNIGIS students who undertake the *Remote Sensing & GIS Applications Unit* or the *Spatial Analysis of Health Unit* will need to purchase IDRISI which is available at a special educational discounted rate. There are extensive training materials and a wide network of educational users especially in the environmental field. IDRISI has a wide range of *raster* functionality for GIS and image processing and a unique set of functions for decision support. It is designed for small project and educational use and is a good entry level GIS.

In 2007, a one-year license of IDRISI 'Andes' cost \$40, an eternal license cost \$ 147. These numbers are adapted annually, the exact numbers for 2008 are not known yet, but they normally do not differ very much from last year's numbers.

- Hardware specifications

IDRISI requires a Pentium IV (or higher) processor running MSWindows 2000, NT or XP. You will also need a graphics card with a minimum resolution of 1024x768 and a minimum of 256MB RAM is required (512MB or greater is recommended). 1GB of free disk space will be needed. A CD-ROM drive is required for installation.

- More information

The website for IDRISI is: <http://www.clarklabs.org>

Geomedia (Intergraph)

- Costs
GeoMedia Professional V6 from Intergraph is provided *free of charge* to all UNIGIS students (terms and conditions apply) for educational use. This innovative product from a leading GIS vendor is specifically designed to integrate geo-spatial data processing into the mainstreams of the modern, open systems information networks which enterprises are presently establishing. GeoMedia Pro is an attractive platform for students who want experience of a commercial product that incorporates leading-edge technologies.
- Hardware specifications
The minimum specification to run GeoMedia Pro is 1.2GHZ processor or greater, 512MB memory, 600MB free space on hard disk, SVGA display required (single monitor recommended). Minimum 800x600 resolution with 16-bit colour, recommend 1024x786 resolution and 32-bit colour.
CD ROM drive, MS Windows 2000 SP4, MS Windows XP SP2, MS Internet Explorer 6 or higher.
- More information
The Web site for GeoMedia products is <http://www.intergraph.com/geomedia>.

To summarize - What software package(s) do you need for the UNIGIS curriculum

Geomedia Professional V6 only works with *vector* data. For *raster* data, you need to buy an extension software package called GeoMedia GRID. UNIGIS does not have discount rates for GRID, so we advise you not to buy GRID, buy IDRISI instead, that package is specifically designed to work with raster data and UNIGIS offers a discount for its students.

If you decide to buy ArcView 9.x, then you have a programme that can handle both vector and raster data, since the software package already includes Spatial Analyst, which is ESRI's raster extension software.

What does the UNIGIS Programme Board recommend

Since most of our tutors use ArcView 9.x themselves, we advise you to buy the one year licensed copy of ArcView 9.x. This way you can get the best support and you have a package that can handle both vector and raster data.

Note: I have checked the availability of the Introductory GIS tutorial for ArcGIS 9.x of approx. 350 pages, the book I referred to yesterday. It only includes a *180-days trial version* of ArcGIS 9.x including Spatial Analyst, so it is of limited use for your studies. Also, ArcView9.x itself already includes excellent tutorials and the SPINlab can give you access to ArcView on-line courses at ESRI Virtual Campus *for free*, so we advise you to just buy the one year licensed copy and just use the software's tutorial and possibly the Virtual Campus. If you however would like to get more information on this book, please visit:

<http://gis.esri.com/esripress/display/index.cfm?fuseaction=display&websiteID=144&moduleID=0>.

At ESRI Press, the price is \$79.95, but UNIGIS can get a discount of 20-30% through Transatlantic Publishers. Even cheaper copies are already available through for instance Amazon.com (from \$24 onwards), but chances are that the 180 days trial version of the software has already been used then.

Next to ArcView 9.x, IDRISI is a package that is widely used in education and environmental applications. For some modules in the second year you will need it. If you know already that you want to do these modules, you can either decide to buy an

eternal license now, or wait with buying a one year licensed copy of IDRISI until you have started the second year of your studies.

1.2.10. *Summer Schools, Winter Schools and other GIS meetings*

UNIGIS International organises Summer Schools and Winter Schools. These can take place at any of the UNIGIS sites. In past years, these workshops took place in among others Austria, Hungary and Spain. The Summer Schools and Winter Schools are organised around a theme, such as 'European Data Sets', 'Land Administration' or 'Location Based Services'. These workshops are optional in the UNIGIS course, though in some cases they can replace an elective module in your study programme. Details on each workshop will be announced separately on the UNIGIS website and by email.

Occasionally, UNIGIS Amsterdam also (co-) organises other events and study days, such as the international study trip with ESRI and an e-learning showcase at Hewlett Packard Amstelveen. UNIGIS strongly supports initiatives of students and alumni to organise study events at their work place, such as the disaster management seminar in Almelo (2006) and the excursion to mobile applications at the Dutch Ministry of Transport, Public Works and Water Management (2006).

1.3. Finances

1.3.1. *Course fees*

PgC

For the postgraduate UNIGIS **Certificate** Course (one year - Modules 1 through 4 and Workshops I and II), the fee is €3,300.-.

PgD

For the postgraduate UNIGIS **Diploma** Course (two years - Modules 1 through 8 and Workshops I, II and III), the fee is:

- €5,500.- for people who have *not* obtained the UNIGIS Certificate yet, and
- €2,200.- for people who have already obtained the UNIGIS Certificate.

MSc

The **Master of Science in GIS** programme takes three years and involves the entire Diploma programme plus an additional third year in which you carry out an MSc. research project and you write a thesis. If you want to register for the **Master of Science in GIS**, you must have obtained the UNIGIS Diploma already, and the additional fee will then be €2.000,-

Other fees

Extra fees must be paid if students fail to meet the deadline to finish their studies (see also section 1.4.8). This means:

As a student of the PgC, you will normally complete the programme within the maximum of 2 years. If you require more time, you will have to pay an additional administration fee of €250 per extra year of study.

As a student of the PgD, you will normally complete the programme within the maximum of 3 years. If you require more time, you will have to pay an additional administration fee of €250 per extra year of study.

As a student of the MSc Course, you will normally complete the programme within the maximum of 1 year. If you require more time, you will have to pay an additional administration fee of €250 per extra year of study.

Fees include payment for:

- All learning materials (with the exception of two additional books and some additional software), course notes, selected texts and readings, computer based learning software, data, help line support, assessment, feedback and certificates;
- GeoMedia Professional, free use of Oracle Spatial;
- Student facilities provided by the Vrije Universiteit;
- Discounts of software and courses, such as ESRI Virtual Campus, ArcView, and IDRISI;
- Free subscription to VI Matrix and Geo-Informatics. GIS Magazine with discount;
- Workshops and selected events, such as the Gemeentedag.

NOT included are: Hardware, Internet connection (preferably broadband), workshop expenses (such as travel and accommodation), and other study-related travel expenses (such as meetings with tutors or other UNIGIS staff at the Vrije Universiteit Amsterdam).

1.3.2. Payment

PgC

Option 1. The total fee of € 3,300.- is paid after confirmation of acceptance, before the commencement of the course.

Option 2. Payment is made in two semi-annual terms of € 1.650,-, with the first payment due after confirmation of acceptance, before the commencement of the course.

PgD

Option 1. The total fee of € 5,500.- is paid after confirmation of acceptance, before the commencement of the course.

Option 2. Payment is made in four semi-annual terms of €1,375.-, with the first payment due after confirmation of acceptance, before the commencement of the course.

When continuing from the PgC:

Option 3. The remaining fee of € 2,200 is paid after confirmation of acceptance, before the commencement of the course.

Option 4. Payment is made in two semi-annual terms of €1,100.-, with the first payment due after confirmation of acceptance, before the commencement of the course.

MSc

Option 1. The total fee of € 2,000.- is paid after confirmation of acceptance, before the commencement of the course.

Option 2. Payment is made in two semi-annual terms of €1,000.-, with the first payment due after confirmation of acceptance, before the commencement of the thesis research.

Applicants will receive a bill with the exact information on how to transfer the money. The applicant has the responsibility to ensure the payment(s) is (are) made; this responsibility will remain at all times. Access to modules can be restricted if fees have not been paid. In these cases UNIGIS cannot be held liable for any study delays.

If you are delayed in making the payment(s) due to unexpected events, contact the UNIGIS Amsterdam office a.s.a.p. Please check all details (correct registration and corresponding fee) before making the actual payment.

1.3.3. Refunds

If a student decides to withdraw from the programme, he or she will remain responsible for the fee for the running year of registration. A year runs from March to March or September to September, depending on the intake you are in. No refunds are made for part of a course (PgC, PgD, or MSc).

Additionally, if a student who has enrolled in the Diploma course decides to withdraw from the programme after having finished the Certificate part of the programme and the student has not yet passed any modules from the Diploma part of the programme, he or she will at least remain responsible for the entire fee for the Certificate part, i.e. € 3,300.- (this effectively means that Diploma students who have chosen pay in four semi-annual terms of € 1,375,- and who have paid the first two terms, have to pay the remaining fee of € 550,- in order to receive their PgC award).

1.4. Assessment & Rules and Regulations

All formal rules pertaining to teaching and examinations are laid down in the Classes and Examination Regulations and the Examination Board's Rules and Guidelines. This document is accessible via the UNIGIS website: www.unigis.nl.

1.4.1. Assessment in the UNIGIS course

Assessment in the PgC and PgD courses takes place primarily through formally assessed assignments and workshop participation. There are no conventional written examinations.

Assessment takes place at the end of each module. To complete a module, official Tutor Assessed Assignments (TAA) need to be completed and sent to the UNIGIS Office. Most TAA involve writing an essay, though other kinds of assignments are also possible. The assignments are often of an 'open' type, which means that the answer is not a matter of yes/no or right/wrong, but requires the presentation of arguments, with the possibility of different correct results. Therefore, the grade is supported by a marking profile, which indicates the strengths and weaknesses of your TAA.

The TAA for the PgC and PgD courses are evaluated by the module tutor and the course director. The module tutor proposes a grade, which can be adjusted by the course director. Both sign the form after evaluating the TAA. Workshops are evaluated by the workshop tutors. Workshops are not graded, but students receive a 'Pass' or 'Fail', based on participation and presentation of results during the workshop. The MSc thesis will be independently assessed by two supervisors who will submit a written report to the Board of Examiners and propose a grade. The Board of Examiners will decide on the final grade of the thesis. Students are also expected to give a presentation on their thesis in front of the examiners and others.

1.4.2. Module assessment

In Appendix I you can find the module assessment form. The marking profile explains how the tutors arrive at the grade. Not all items of the grading scheme are, however, of equal importance. For example, content is more important than form. Also, the meaning and importance of the different items in the marking profile differs somewhat for different types of assignments. For instance, referencing is more important when you write an essay than when you need to produce a map. A single grade is given for all TAA of a module collectively. For this reason, we ask that you submit all the work for one module at one time.

For grading, the Dutch 10 to 1 system is used, where 10 means excellent and 1 means poor. For the final grade, numbers are registered up to one digit behind the comma in the UNIGIS course administration.. **To pass, a 5.5 or higher should be obtained.** It is

not necessary to obtain a pass for all items of the marking profile; the final grade determines if you have passed the TAA or not. A cross is placed on the scale line to give an indication of the score on the item in the marking profile. The dotted line indicates the separation between pass and fail.

The TAA aim to test if you have understood the material that has been presented in the module. In general, several types of understanding are tested: 'knowledge' (reproducing course material), 'insight' (linking, associating, and building arguments based on the course material), 'application' (applying the course material to external topics, usually with a fixed answer), and 'thinking' (creative and productive application, often more answers are possible and require argumentation). The term 'course material' includes not only the basic material of the course, but also any relevant reference and further reading appropriate for the topic.

To give you an idea about our assessment criteria, some explanation of the elements of the marking profile is given.

Form

Structure and organisation: A good assignment contains an introduction, middle part, and conclusion. The text is structured in sections and paragraphs that correspond with the structure of the arguments. Think further about correct titles, logical order of items, and relevance of items.

Style and grammar: For good style and grammar it is not necessary to be an English novel writer, but your assignments should be clear, readable, and neat. Remember to use your computer spell check (and grammar check if available) whenever possible; it will remove some errors.

Visual presentation: This refers to the appropriate use of tables, graphs, figures, and a good lay-out. It also includes other form aspects, such as a correct title page.

Referencing: Guidelines for correct referencing can be found in the library at the UNIGIS website, see 'English language and reference aids'.

Content

Correct answers to the assignments: Some assignments have a single, correct answer. The assessment of the validity of the answer of essays is based on evaluation of the arguments they contain.

Analytical approach: An analytical approach (as opposed to a descriptive approach) is expected. An analytical approach shows good understanding of the topics discussed, the problem is well-analysed.

Critical and balanced treatment of subject: These criteria refer to the argumentation and reasoning used in the assignment.

Originality: Original answers require creative thinking; original answers may connect to the current state of affairs and possible future developments.

Coherent conclusion: The conclusion is a very important part of your assignment, in which you give an answer to the problem, based on your argumentation and/or findings.

Adequate use of sources: Relevant, up-to-date, and representative material from books, Internet, or other sources can improve the quality of the assignment but you should cite all references in your work, and list the references in full at the end.

1.4.3. Link with the ECTS grading scheme

The European Credit Transfer System is used among others to convert credits and grades between the different national systems of EU member states. The table below

gives the conversion for the Dutch system to ECTS. See also:

<http://europa.eu.int/comm/education/socrates/ects.html>

<i>European Credit Transfer System</i>		
Grade according to the Dutch system	ECTS grade	Description
8.1-10.0	A	EXCELLENT - outstanding performance with only minor errors
7.5-8.0	B	VERY GOOD -above the average standard but with some errors
7.0-7.4	C	GOOD -generally sound work with a number of notable errors
6.1-6.9	D	SATISFACTORY- fair but with significant shortcomings
5.5-6.0	E	SUFFICIENT - performance meets the minimum criteria
5.0-5.4	FX	FAIL- some more work required before the credit can be awarded
>5.0	F	FAIL- considerable further work is required

Table 1: ECTS system

1.4.4. *Reassessment*

Students are allowed two resubmissions (see Article 15.3.d of the Classes and Examination Regulations) if they fail a module in the PgC or PgD course. In this case, the module tutor will contact the student and will give him advice on how to improve his assignment and agree on a deadline for resubmission. If a student fails a workshop, he or she will normally be asked to carry out an additional assignment or, in case of a severe fail, to redo the workshop next year.

Students who fail a module or a workshop will normally be allowed to continue with their programme of study on the undertaking that the failure will be retrieved within a set period of time.

If the student fails the module a third time, the course director can decide, at his discretion, to:

- require the student to repeat the unit;
- allow the student to study an alternative module in place of the failed unit;
- require the student to withdraw from the programme and offer the student a statement of achievement which will specify the modules passed.

The study delay that will generally be the consequence of (repeated) resubmission of a module, can lead to a negative study recommendation from the Examination Board. See Article 10 of the Examination Board's Rules and Guidelines for more information.

Regarding the MSc course, a thesis will only be considered by the Board of Examiners if the thesis supervisors have decided that the thesis is of acceptable standard. In case of failure, the student will be asked to carry out revision works, in consultation with the thesis supervisors.

1.4.5. *Submission of assignments*

Assignments must be submitted by email, as well as (for safety and official reasons) by regular mail (two paper copies). Please observe the following guidelines when submitting your assignments:

1. Send in *all* assignments belonging to the same module at the same time (don't sent them in separately at different time intervals);

2. Submit two copies of each assignment (An 'office' copy that will be kept on your file and a 'top' copy that will be returned to you after it has been assessed);
3. Send your assignments to the central UNIGIS office in Amsterdam. We will return a confirmation upon receipt;
4. Use a front cover which provides your full contact details (address, phone and email) in addition to your name, intake number and the title of the assignment and the module;
5. Please do not enclose other messages in your assignment envelopes. If you wish to draw our attention to some other aspect of the course, please send a separate letter or email;
6. Sent the digital version of your module assignments to our UNIGIS secretary, i.e. unigis@feweb.vu.nl;
7. Use the word 'ASSIGNMENT' as the first word of the title of the message to distinguish it from the general enquiry messages we receive to this address;
8. Send your assignment as an attached file. The text should be in 'final layout' format so that we can print out a copy should this be necessary. The UNIGIS staff use MSWord as our default word processing package but we can accept materials in any of the formats which will read into MSWord, which comprises most of the commonly used packages. Note however that often images and other non-text items may be distorted. We do not take responsibility for this so always send a paper copy too. If you have Adobe distiller/writer, we can accept PDF formatted assignments. Large assignments might be sent in zipped files.

1.4.6. Exemptions

The regulations allow students to apply for exemptions for modules (or parts of modules) where they believe they have already covered the material. We can allow credit for prior learning on two grounds:

1. If you have already taken a course which duplicates the material in a module, you are invited to submit the curriculum of the course together with evidence of successful completion. We will then take a decision about whether there is a sufficient comparability between the previous course and the module to allow exemption.
2. If you believe that through your employment you are already entirely familiar with the material contained in a module you might consider asking for exemption on the grounds of prior experience. In these circumstances, we would need to be provided with detailed evidence of the extent and currency of your prior experience so that we can take a judgement about whether an exemption is acceptable.

When you have read through a module and you feel you wish to apply for an exemption, please send a letter or email making your case to the UNIGIS office.

There is a maximum number of credits that can be granted as exemption, see Article 18.4 of the Classes and Examination Regulations. Further, it is not possible to claim more than 10 ECTS in the modules of the PgC and PgD course each (so 2 out of 4 modules in each study year). It is also not possible to obtain an exemption for a Workshop or for Module 1.

1.4.7. Assessment period

Tutor Assessed Assignments will be assessed and returned to students within 15 working days of receipt, provided that the student has submitted the work according to

the programme's timetable. This assessment period will be extended to 60 days in case students submit the module in question after the module deadline as included in the programme's timetable, or when the module is submitted in between 15 June and 15 August. See also Articles 15.2 and 15.3 of the Classes and Examination Regulations.

1.4.8. Other regulations

Workload and credits

You are expected to complete around 1,680 hours of study for the complete UNIGIS course. For example, to complete the PgD in two years you will need to study approximately 14 hours per week per academic year (40 weeks) or 10.8 hours per week if you calculate with full years (52 weeks). Distance learning, however, means that you manage your own time so you can allocate study times to suit yourself. You may find you have a couple of weeks when you can work full time on the course, then several weeks where it is difficult to fit in any work.

The assessment schemes are designed to conform as far as possible to the European Credit Transfer Schemes (ECTS), which universities have in operation. One unit of credit reflects (according to the Dutch Law on Higher Education) approximately 28 hours of learning experience. The overall number of hours required for completion of the course is 1,064 for the Postgraduate Diploma course alone and 1,680 for the entire MSc. programme. The overall length needed to complete the MSc programme is three years. Note, however, that these numbers can vary substantially from student to student.

Study progression

Students and tutors will be expected to maintain regular contacts. In addition to these informal contacts, the UNIGIS office monitors the progress of students and will send reminders should the assessed assignments not have been received after the deadline of the module. Students have, however, also the obligation to inform the UNIGIS office of any delay in their study. If you will not be able to meet the deadlines, you should send a message to the UNIGIS office stating the reason of the delay and the expected date of submission.

Modules and workshops should be studied in the order described in Chapter 2. Students will get access to the next module when the tutor assessed assignments of the current module are received at the UNIGIS office. Some elective modules have prerequisites regarding other modules, see the module description in Section 2.7. Workshop II, for example, requires the completion of modules 1 through 3, while Workshop III requires the completion of the PgC programme and an additional two 5 ECTS core-modules of the PgD programme.

Interruption of study and delay

In a distance-learning course designed to attract primarily working, mature students, it is likely that some students will find it necessary to temporarily interrupt their studies due to professional or personal circumstances. Accordingly, students will, with the agreement of the Amsterdam UNIGIS Organisation, be allowed to suspend their studies with the limitation that the minimum period of suspension of study will be half a year. It is required to send a written request to the UNIGIS office to apply for suspension. The student will subsequently join the course calendar of a later intake.

Extenuating circumstances – Flexibility in the UNIGIS course

The UNIGIS course offers flexibility in case of extenuating circumstances (illness, family or work-related circumstances, etc.). In these cases, try to contact the UNIGIS

office as early as possible. In consultation with the course director or a representative the effects on the course will be discussed and a solution will be implemented.

Maximum length and registration for the UNIGIS course

The table below shows the minimum and maximum length of the PgC, PgC, and MSc courses. If the maximum lengths are not met, additional fees must be paid (see Section 1.3.1).

	<i>Minimum</i>	<i>Maximum</i>
PgC	1	2
PgD (incl. PgC)	2	3
MSc (incl. PgD)	3	4

Study in excess of the programme

It is not allowed to study more modules or participate in more workshops than required for the PgC or PgD course. If a student wants to do more modules or participate in more workshops, he or she can only do this after approval of the programme director and after payment of additional fees.

Language

In principle, the UNIGIS course is an international course taught in English. This means that all study materials are provided in English, that Workshops are held in English, and that the student's work (assignments and thesis) needs to be submitted in English. However, students may decide to submit their work in Dutch and do their thesis in Dutch if they feel more confident in doing so. An exception are the modules taught by foreign tutors, for which the assignments must be submitted in English (tutors announce themselves at the start of a module; if you'd like to know if a specific module can be submitted in Dutch please contact the UNIGIS office). Also, workshops will always be fully taught in English if any one of the students or tutors does not speak Dutch.

If a student decides to do his assignments and thesis in Dutch, he must consider the fact that his work will not have international exposure and that international interaction is reduced. Regarding the MSc, some topics can only be chosen if the thesis will be written in English. Note also that a student will not be eligible for qualification 'European Masters in GIS' if the work is carried out in Dutch.

Fraud

See Article 3 of the Examination Board's Rules and Guidelines.

Appeal

If a student does not agree with a decision of the tutor, (s)he can appeal at the Programme Committee. In this case, the student first needs to send a written letter or email to the tutor, stating his point. If the tutor and the student cannot come to an agreement, a member of the Programme Board will act as a second supervisor or mediate between the student and the tutor.

If this student is not satisfied with the outcome, (s)he can send a written letter or email to the Programme Committee explaining his/her case. The Programme Committee can then give a (non-binding) advice to the Programme Board whether or not anything should be changed in the programme based upon this case.

Also, if the student is not satisfied with the outcome, the student can contact a student advisor of the Faculty of Earth and Life Sciences who can give advice on possibilities of appeal within the legal framework of the Vrije Universiteit.

Finally

- Please inform the UNIGIS office in case of a change of your contact information (e-mail, home address, new employer, work address, job function, etc.)
- For questions relating only to the modules you can contact the module tutors. For all other matters, please contact the UNIGIS office secretary.
- For each student a file is kept at the UNIGIS office which holds the registration forms, (copies of) messages, submitted modules, and other information relevant for the course.

The Examination Board grants awards and assesses MSc theses. The Examination Board consists of the following permanent members:

- Prof. dr. Henk J. Scholten, Scientific Director of SPINlab and Professor in Spatial Computer Science;
- Prof. dr. Piet Rietveld, Head of the Department of Spatial Economics and Professor in Transport Economics;
- Jasper Dekkers MSc, Lecturer at the Faculty of Economics and Business Administration and Coordinator of the UNIGIS MSc. in GIS.

Other members will be co-opted into the Examination Board as appropriate.

The Programme Committee consists of:

- Prof. dr. Joop van der Schee, Professor in Educational Geography;
- Jasper Dekkers MSc, Lecturer at the Faculty of Economics and Business Administration and Coordinator of the UNIGIS MSc. in GIS;
- Two student members, currently being Fiona Smith and Johan Keurentjes.

2. The UNIGIS Programme

2.1. General

The UNIGIS course consists of modules, workshops (embedded within the yearly UNIGIS Conference held in the Netherlands) and a thesis (see Figure 2). Altogether, UNIGIS offers fifteen modules and three workshops. Some modules are compulsory (core modules) while others are elective. Two workshops are compulsory as well. Below, the course programme of the part-time PgC, PgD and MSc courses is described.

2.2. Description of the Programme

Geographical Information Systems are finding increasing application in a broad range of organisations from utilities companies to environmental consultancies. Specialised undergraduate provision is still in its infancy and there are thus a large number of mid-career professionals who are being asked to take on GIS responsibilities but whose backgrounds do not include any GIS experience. For many such professionals, taking a career break in order to obtain a GIS qualification is simply not possible. UNIGIS therefore offers a part-time, distance learning route to postgraduate qualifications in the GIS field suitable for those using GIS in the workplace. The UNIGIS course is designed to provide a deeper and more balanced education in GIS than would be provided by vendor training in GIS software.

The UNIGIS Postgraduate Certificate course (PgC), Postgraduate Diploma (PgD) course and Master of Science programme (MSc) together form a distance learning study programme, which is aimed at middle to senior management, project managers and information technology personnel, though other suitably qualified candidates may be considered. As such, it focuses on the practical knowledge and skills required designing and implementing GIS in real situations from a scientific point-of-view. It covers the necessary theoretical and technical material for all major aspects of the GIS design process. The course is intended to create professionals who understand the breadth of technical issues involved in the design of GIS, who can use their knowledge creatively and who can control the design and implementation of GIS in an organisation. The PgC, PgD and Master of Science (MSc) programmes aim to provide students with an understanding of the technical, geographical and organisational aspects of GIS. In doing so it provides hands-on experience. The need for this academic programme is reflected in the high demand and mobility of individuals with GIS skills, and the rapidly expanding nature of GIS as a professional skill.

The part-time Master of Science programme takes about three years to complete and consists of three stages: a Certificate, then a Diploma, followed by a thesis for a Master of Science title. The Certificate takes one year to complete. The Postgraduate Diploma will take in total two years to complete and is designed to provide students with both an academic and practical appreciation of GIS technology. The emphasis throughout the programme is on the design of GIS strategy. Students are encouraged to link theory and skills training with experience from their own work environment.

Students who complete the Postgraduate Diploma course with a sufficient grade average and have the adequate academic background will be able to continue with the Master of Science part of the programme. The Master of Science will be awarded after the successful completion of an individual research thesis. This part of the programme takes one year to complete. If one has obtained a MSc, one is entitled to do a PhD, which would require an additional four years full-time.

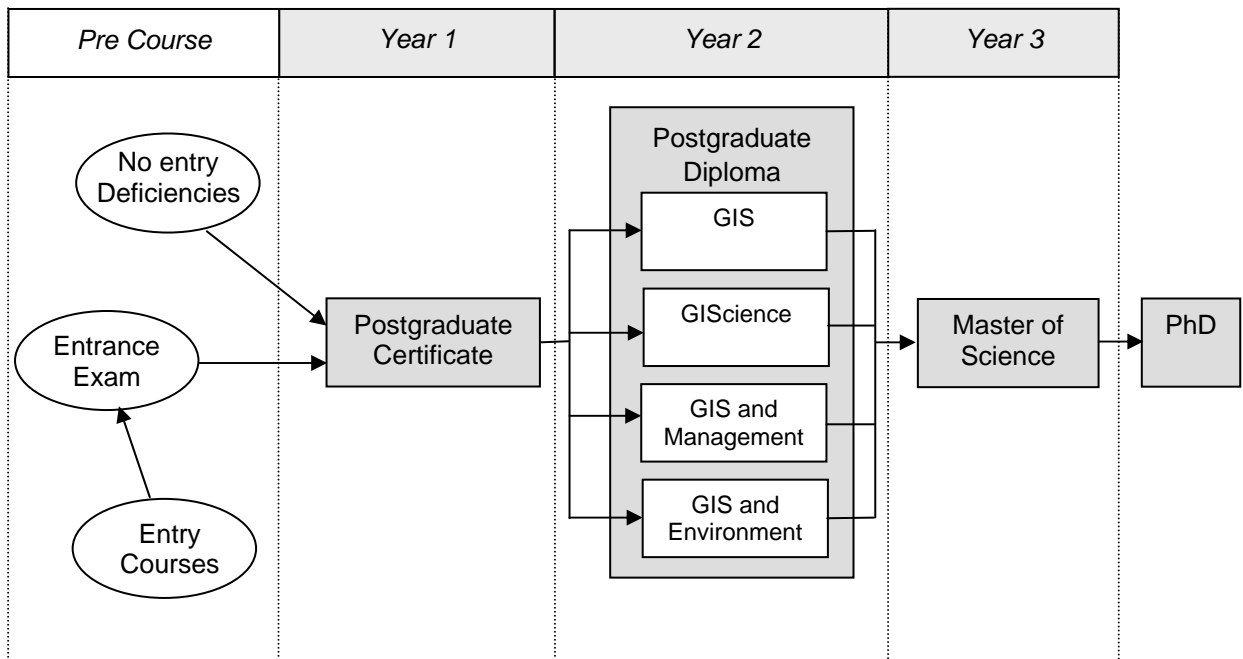


Figure 1: Structure of the UNIGIS part-time curriculum

The study materials are delivered through the Internet and evaluation takes place by assignments and not by exams. Communication between students and tutors mainly takes place using email and interactive websites. However, we recognise that face-to-face contact is also needed for a successful course. Therefore, workshops and seminars will be organised, and it is always possible to make an appointment for a personal interview or a chat with tutors at the UNIGIS office at the Vrije Universiteit Amsterdam.

Figure 1 visualizes the structure of the part-time curriculum in more detail. The PgC course in year 1 consists of four compulsory modules and one compulsory workshop. The PgD course in year 2 is a one-year continuation of the PgC course. It again consists of four additional modules and one additional workshop. So, to obtain the PgD a total of eight modules (four PgC + four PgD) and two workshops (one PgC + one PgD) should be completed in two years.

During the second year, the student specialises in a certain area (or 'pathway'), which allows a choice of elective units so that an individual programme of study can be designed. Four pathways are available to students (a more elaborate description of the pathways can be found in Section 2.3.2):

1. GIS
2. GIScience
3. GIS and Management
4. GIS and Environment

The aims of the PgC and PgD courses are to develop within students:

1. a knowledge of the technical aspects of GIS detailed enough to allow them to follow the significance of technical debates and to interact confidently with software vendors, technical experts and clients;
2. a thorough understanding of the Geographical aspects of GIS by introducing the topics of spatial reasoning, spatial analysis and spatial presentation;

3. an appreciation of the organizational contexts within which GIS are used sufficient to enable them to enhance the information handling capabilities of their organisation.

These aims will be achieved by enabling and encouraging students to:

- identify the linkages between technology, data, methods and organisations in the use of GIS;
- develop competence in data representation and the use of spatial analysis techniques;
- gain experience in the design, implementation and analysis of databases;
- communicate analyses effectively and coherently in writing;
- apply the knowledge and understanding acquired within organisational contexts.

With a PgD it is possible to enrol for the MSc part of the programme (if the other admission requirements are also met). The additional aims and objectives of the MSc part are:

4. develop the ability to critically evaluate relevant research to a higher level;
5. extend problem solving skills in the GIS area by reference to current literature;
6. provide, by means of a thesis, a vehicle to enable the student to develop and demonstrate practical and theoretical expertise in an appropriate field.

The PgC, PgD and MSc are designed to be free standing, but complementary, courses presented to professional standards. They will satisfy the requirements of a wide range of employers for the training and development of information technology personnel and middle management. They will satisfy also the needs of individuals for professional development to increase job mobility and to enhance career prospects.

The materials have been adopted by the international UNIGIS network of universities as the core materials in their programme for advanced GIS education.

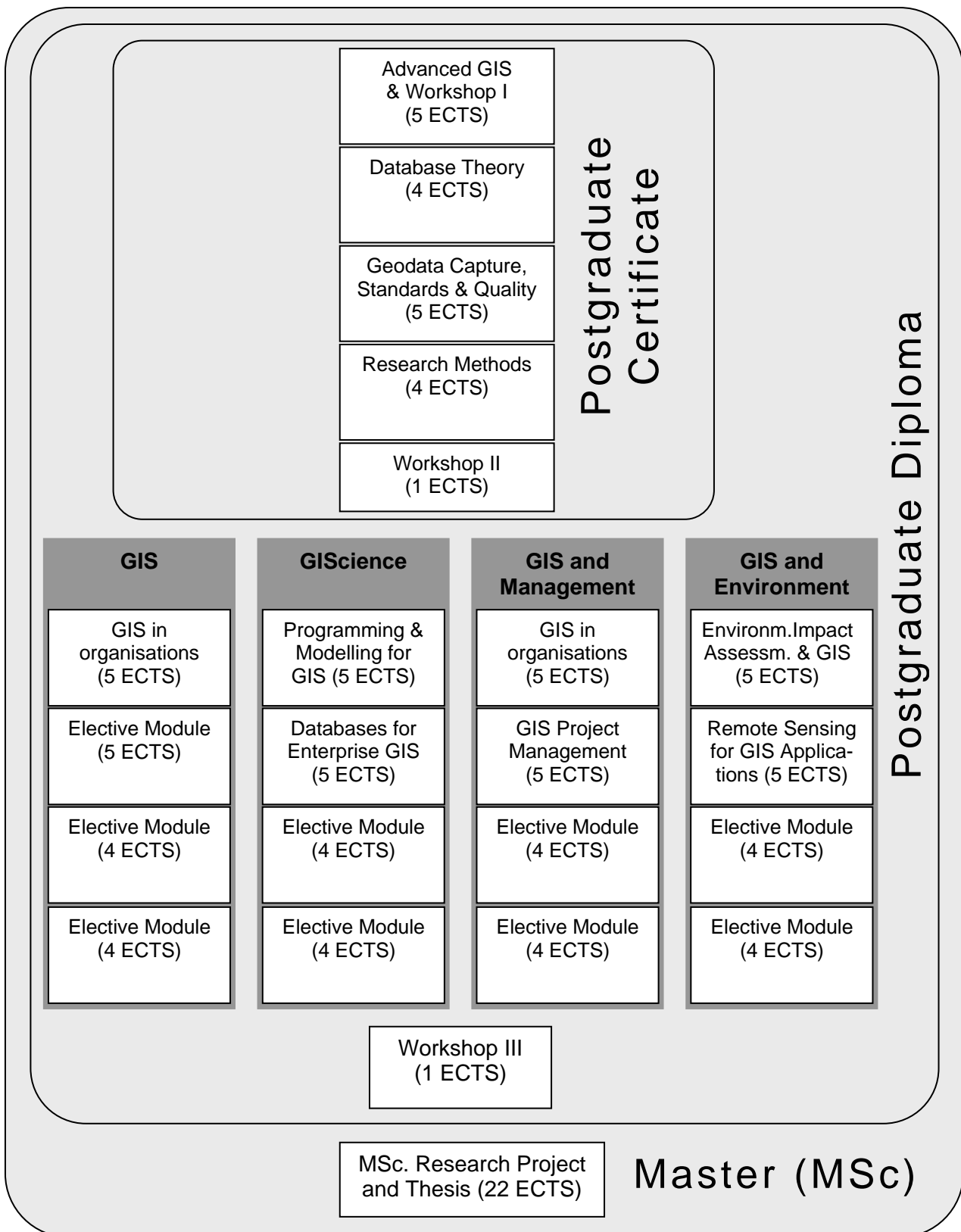


Figure 2: Modules and Workshops in the UNIGIS part-time course.

2.3. Structure of the Programme

2.3.1. *The Postgraduate Certificate Course*

The PgC course is made up of four compulsory modules and two workshops. The first introductory workshop is part of the first module and serves as an introduction to GIS. The workshop includes a session on course organisation and objectives, and is designed to create the tight control necessary for distance learning. It may include initial training for the course software, but above all it provides an opportunity for getting to know staff and fellow students. Although the workshop is not compulsory, the Programme Board strongly recommends attendance. The second workshop, which is compulsory, will be held at the end of the PgC course and is for consolidation and application of the course material, for hands-on experience, and for personal contact. You will attend this workshop during the Annual UNIGIS Conference in Amsterdam. Modules are progressive and, although self-contained in terms of academic content, will use material developed in earlier parts of the course. The course progresses from module to module in numbered sequence.

Awarding of the PgC

Although the majority of students will wish to pursue their studies at least to the Diploma level, some students may decide to terminate their studies at an earlier stage. Students who successfully complete four Modules and Workshop II will be eligible for the award of Postgraduate Certificate in GIS. The Postgraduate Certificate is awarded by the Examination Board.

2.3.2. *The Postgraduate Diploma Course*

To obtain the award for the PgD course, a student must study eight modules and participate workshops I and II. When entering the PgD course, a student needs to select one of the four pathways. Each pathway contains a number of core (compulsory) modules and one or more elective modules. All modules offered in the PgD programme are elective modules for a pathway (if they are not compulsory in that pathway). UNIGIS Amsterdam offers the following four pathways:

Pathway 1: Geographical Information Systems

Philosophy: This course is aimed at team leaders/managers with a need for general GIS training or specialists who require a broad coverage of the field. It is a broadly based postgraduate qualification in the field of GIS which focuses on the principles of design in relation to systems, human computer interfaces and applications. There is a strong emphasis on the linkage between technology, data organisation and methods. It will support career development or career change. By providing a broad coverage of GIS field, it will support professionals seeking to extend and consolidate more focussed knowledge.

Aims:

- a) provide a broadly based postgraduate qualification in the field of GIS for professionals;
- b) cover the whole field of GIS;
- c) emphasise the linkage between technology, data, organisations and methods;
- d) focus on the principles of analysis and design at systems level, human computer interface level and applications level;
- e) provide experience of the use of software products of different types including setting up, data entry, functionality and applications.

Structure: In addition to the PgC, the student needs to complete one core module, three elective modules and workshop III. The compulsory core module is Module GIS in Organisations. The other three modules can be selected from the available optional module list below.

Pathway 2: Geographical Information Science

Philosophy: This course is aimed at people who want to develop careers in the technical and scientific areas of GIS or applications developers who want to specialise in GIS. Emphasis is placed upon design and organisational issues in the context of applications development. Experience in the use of software products and of applications development forms an important part of the course.

Aims:

- a) provide a consolidated view of the linkage between technology, data, methods and organisations in GIS;
- b) focus on computing methods and computing algorithms;
- c) focus on databases and architecture of GIS systems;
- d) provide experience in the use of different software products and of applications development;
- e) emphasise applications development in the contexts of design and organisational issues.

Structure: In addition to the PgC, the student needs to complete two compulsory modules, two elective modules, and workshop III. The compulsory modules are:

- Module Programming & Modelling for GIS
- Module Database for Enterprise GIS

The third and fourth modules are electives, though we strongly recommend doing the elective workshop 3-21 Spatial Databases, if available.

Pathway 3: Geographical Information Systems and Management

Philosophy: This course is aimed at established managers who have new or extended responsibility for GIS projects or at those seeking career development into

- more managerial roles and who need to develop knowledge and skills of management in a GIS context.
- Aims:
- provide a consolidated view of the linkage between technology, data, methods and organisations;
 - focus on GIS in organisations;
 - cover analysis and design methods with an emphasis on management.
 - emphasise applications development in the contexts of design and organisational issues.
- Structure: In addition to the PgC, the students need to complete two compulsory modules, two elective modules, and workshop III. The compulsory modules are:
- Module GIS in Organisations
 - Module GIS Project Management
- The elective modules can be selected from the list below.

Pathway 4: Geographical Information Systems and Environment

- Philosophy: This course is aimed at specialists in the area of environmental applications or project management who wish to enter the GIS field or GIS developers and managers who wish to enter the environment field
- Aims:
- provide a consolidated view of the linkage between technology, data, methods and organisations;
 - cover the technical and systems background for developing environmental applications;
 - focus on the procedural and methodological requirements for environmental analysis;
 - emphasise environmental applications and the theory and methods of environmental modelling;
 - provide experience in the use of different software products and of applications development.
- Structure: In addition to the PgC, the students need to complete two compulsory modules, two elective modules, and workshop III. The compulsory modules are:
- Module Environmental Impact Assessment & GIS
 - Module Remote Sensing for GIS Applications
- The elective modules can be selected from the list below.

The list below gives an overview of all modules and workshops in the UNIGIS programme. A description of each module and workshop from the PgC and PgD programme can be found in Section 2.7. The Summer and Winter Schools are organised by UNIGIS International and may not be given each year. In some cases, a Summer School or a Winter School may be taken as an elective module. This usually requires following the workshop and doing some additional assignments. Details are announced at the UNIGIS website in due course.

<i>Code</i>	<i>Elective modules</i>	<i>Credits</i>
P2-EM5/Sy1Mt1	GIS in Organisations	5 ECTS
P2-EM5/Sc1	Programming & Modelling for GIS	5 ECTS
P2-EM5/Sc2	Databases for Enterprise GIS	5 ECTS
P2-EM5/Mt2	GIS Project Management	5 ECTS
P2-EM5/En1	Environmental Impact Assessment & GIS	5 ECTS
P2-EM5/En2	Remote Sensing for GIS Applications	5 ECTS
P2-EM5EU	European Aspects of GIS	5 ECTS
P2-EM41	GIS for Society	4 ECTS
P2-EM42	Spatial Analysis and Health	4 ECTS
P2-EM43	Visualisation for GIS	4 ECTS
P2-EM44	Internet GIS	4 ECTS

Table 2: List of optional modules (ex. Article 9 Classes and Examination Regulations)

Award of the PgD

The PgD will be awarded if the student has passed eight modules with a grade of 5.5 or more and if he or she has passed the two compulsory workshops, followed during the annual UNIGIS Conferences.

2.3.3. The Master of Science Course

When you have decided that you would like to continue in the Unigis programme to complete an MSc, contact our administration to make an appointment to come into the Unigis Office to discuss your plans. Perhaps you already have a research topic in mind, perhaps you have several possibilities, or maybe you are in need of some inspiration, but you need to talk about your future topic and what the MSc entails. You must also be sure that you qualify to start on the MSc programme.

The MSc is thus seen as a continuation of the PgD course, which permits good students to pursue a research topic of their choosing. The student in conjunction with the Educational Course Team will select the research topic. The student will conduct her/his research independently; with distance coaching from the supervisors when needed. The resulting thesis will subsequently be submitted for assessment. The Educational Course Team will encourage students to begin to prepare thesis proposals during the later stages of their PgD.

Planning and Duration

Formal registration for the MSc will normally take place once a year, although students who wish to do so will be encouraged to begin to work on their theses immediately after their PgD results are published. At an early stage, students will be required to submit a revised project outline, which will be assessed by a member of the Educational Course Team and will account for 10% of the MSc marks. The project outlines are discussed during an MSc workshop at the Vrije Universiteit each year. The revised project outline will provide a clear basis for the remainder of the project and should include: a summary of the main purposes of the thesis; chapter structures; draft introductory chapters; an assessment of data sources; draft questionnaires; annotated bibliographies; program specifications; and action plans. The UNIGIS office will place a copy of each student's project outline, and the supervisors' comments, on file for later inspection.

The minimum period in which a student will be allowed to complete a thesis will be one year. Students will therefore be able to complete their MSc studies in a minimum of three years (two years for the PgD plus one for the thesis). It is expected that most students will progress immediately to the MSc upon completion of their PgD. Students

who receive their PgD will be permitted to register as MSc students provided they do so within four years of the date of their initial PgD registration. Students who elect to study for an MSc but who do not complete within the registration period will retain their entitlement for a PgD award. The Examination Board will have the right to extend the registration periods of students where it believes this to be appropriate. Except where the Examination Board deems an extension to be appropriate, the maximum period of registration for the MSc will be five years from the date of initial registration.

Student Workload Requirements

According to the Dutch Law on Higher Education, an MSc degree is expected to be a minimum of 60 credits (ECTS) of 28 hours, which equates 1680 hours of study, though normally it is about 1800 hours or 65 credits. Students will already have accumulated 38 credits from their PgD studies and will be expected to devote a minimum of 616 hours or 22 credits to producing their MSc theses.

Topics

Dissertation topics will be drawn from within the broad area of GIS research. The Educational Course Team will advise students about the acceptability of topics and will help them to develop thesis proposals. Students will be allowed, indeed, encouraged to develop MSc theses from work based projects. Where this is the case, however, the Educational Course Team will need to be persuaded that the additional work which the student proposes is of appropriate academic level to merit the award of an MSc. Staff will give advice about the conversion and extension of work-based materials into MSc theses. Material that has previously been submitted for an academic award will not be accepted. Students will be required to provide evidence that they have access to appropriate resources.

Length

Dissertations will not normally exceed 20,000 words in length. Where a thesis contains a substantial technical element, such as the development of a computer application, theses substantially shorter than 20,000 will be accepted.

Supervision

Each student will be allocated two supervisors. One will be responsible for ensuring that administrative issues are efficiently resolved. The other supervisor will be allocated on the basis of topic supervision. Supervisors who do not teach on the UNIGIS course may be appointed to supervise MSc topics where appropriate. Supervision will be primarily by distance methods, although students will be encouraged to make visits to the Vrije Universiteit and, if needed, to make use of the facilities of the SPINlab. The MSc coordinator oversees the MSc programme and organises the MSc Workshop.

Dissertation Assessment

The first step in the dissertation assessment is the independent assessment of the two supervisors. After they agree that the thesis is of sufficient quality, they will each write a report and propose a grade. The two reports will be submitted to two members of the Board of Examiners. These will assess the thesis and determine the grade. The final grade is the average of the grades of the two members of the Board of Examiners.

The Board of Examiners will have the right to invite candidates for oral examination that will be conducted by members of the Educational Course Team and the Board of Examiners. Where appropriate, the members may require that a candidate provide a demonstration of any software, database, or application that has been developed as part of the research. If a student declines to attend for a viva voce examination or to provide a demonstration, the Board of Examiners will base their award purely upon the

thesis as presented. Theses will be assessed on the following criteria (in random order):

- Critical evaluation of ideas and appreciation of the field of study
- Practical technique and approach
- Discussion of results
- Oral presentation

More information on the MSc course can be found in the MSc handbook, available in the Library-section of the UNIGIS Amsterdam website.

European Masters in GI Science

See Section 2.4.

Award of the MSc

For more information about specific award classifications that may be granted to the degree, see Article 9 of the Examination Board's Rules and Guidelines.

2.4. European MSc in GIS Programme

2.4.1. General

This 'EuroMaster' is not a degree in its own right, but requires graduation in a GIS Programme at Master level from a participating university, one of which is the Vrije Universiteit. So, if you successfully complete our MSc in GIS programme, either part-time or full-time, you may also be eligible for the European Master's degree in GIS (EMGISc), but you have to fulfil certain requirements along the way. This section explains more about the how and what of the EuroMaster and how to qualify for this special MSc degree.

2.4.2. Genesis of the EMGISc Programme

UNIGIS is also active in the European Masters programme. This European joint curriculum at advanced level for GIScience is focused on the objective of one standardized, pan-European post-graduate qualification for professionals active in the field of Geographic Information. Beyond that, EuroMasterGI alumni will be specifically competent in dealing with the European dimension of Geographical Information: this extends to European organisations, data sets, standards and issues as well as trans-national and multi-lingual projects.

EuroMasterGI brings academic institutions from many European countries together in offering a unified curriculum and a strong international perspective on GI. Based on institutions' degree programmes the European Master offers a specifically international add-on qualification recognising students' efforts for a wider European perspective.

Alumni will be proficient in up-to-date Geographical Information Processing / Geographical Information Science as well as in a full range of Europe-wide issues, therefore being highly qualified for leading and active roles in agencies, enterprises and academia dealing with spatial view and any kind of spatial information.

More information can be found at www.euromastergi.org.

2.4.3. Examination Components EMGISc Programme

As a student of UNIGIS Amsterdam, your qualification will be designated as conforming to the "European Masters in GIScience" specifications if the following requirements are met:

1. You have completed the UNIGIS Amsterdam postgraduate Diploma programme
2. Compulsory curriculum topics are covered (this is provided by the UNIGIS course)
3. The master's thesis is written in English language
4. The module European Aspects of GIS (5 ECTS) has been successfully completed
5. An international learning experience (e.g. Summer School) with a minimum of 4 ECTS has been successfully completed (only non-virtual courses, eLearning / telelearning does not qualify)

For some of the above requirements the board has agreed to grant exceptions if students submit well argued applications through their institution. Exceptions require that the general EMGISc objectives are met. For more information on the European Masters in GI Science see <http://www.euromastergi.org>.

2.5. Transitional arrangement old curriculum

Since September 2008, students take their modules from the new curriculum. Students from earlier intakes still study in the old curriculum, but are offered the opportunity to switch to the new curriculum, which has more modules to choose from, and updated module materials. The following table explains the options students *from the old curriculum* have to complete their PgC or PgD programmes.

<i>Current situation</i>	<i>Options</i>
First year student (PgC)	<p>Continue in old curr.: The student has until 31 August 2010 to complete the PgC programme.</p> <p>Transition to new curr.: Next to the four PgC-modules from the old curriculum, the student has to take the module Research Methods from the new curriculum. S/he will get three extra months study time to complete this module. Subsequently, the student can enrol in the second year (PgD) of the new curriculum.</p>
Student wants to start with PgD, has done PgC in old curriculum	<p>Transition to new curr.: the student has to take the PgC-module Research Methods from the new curriculum. S/he will get three extra months study time to complete this module. Subsequently, the student can continue in the new curriculum.</p>
Second year student (PgD), has done PgC in old curriculum	<p>Continue in old curr.: The student has until 31 August 2010 to complete the PgD programme.</p> <p>Transition to new curr.: the student has to take the PgC-module Research Methods from the new curriculum. S/he will get three extra months study time to complete this module. Subsequently, the student can continue in the new curriculum.</p> <p>Next, for the 4 pathways the additional rules apply that can be found in <u>table 4</u> (see the next page).</p>
Third year student (MSc), has done PgC and/or PgD in old curriculum	<p>No transition rules apply</p>

Table 3. Transitional arrangement PgC, PgD and MSc

<i>Pathway</i>	<i>Old curriculum</i>	<i>New curriculum</i>
<u>GIS</u>	GIS in Organisations + 3 old elective modules	<ul style="list-style-type: none"> • GIS in Organisations remains valid • 3 elective modules must be taken, the old elective modules remain valid
<u>GIScience</u>	Database Theory II Applications Development GIS and Modelling + 1 old elective module	<ul style="list-style-type: none"> • <i>Database Theory II is no longer valid.</i> Instead, the new module Databases for Enterprise GIS must be taken • Applications Development + GIS and Modelling are equivalent to the new module Programming & Modelling for GIS • 2 elective modules must be taken; 1 old and 1 new, or 2 new elective modules
<u>GIS and Management</u>	GIS in Organisations Project Management I Project Management II + 1 old elective module	<ul style="list-style-type: none"> • GIS in Organisations remains valid • Project Management I + Project Management II are equivalent to the new module Project Management • 2 elective modules must be taken; 1 old and 1 new, or 2 new elective modules
<u>GIS and Environment</u>	Remote Sensing and GIS GIS and Modelling EIA and GIS + 1 old elective module	<ul style="list-style-type: none"> • Remote Sensing and GIS is equivalent to the new module Remote Sensing for GIS Applications • EIA and GIS is equivalent to the new module Environm. Impact Assessm. & GIS • <i>GIS and Modelling is only valid</i> if, next to this old module, the old module Applications Development is taken. The 2 modules together then are equivalent to the new module Programming & Modelling for GIS that may be used as the new elective module in this pathway (to be credited with 5 instead of the regular 4 ects). In this case, only 1 new elective module has to be taken. • Apart from the exception mentioned in the previous line, in principle 2 elective modules must be taken; 1 old and 1 new, or 2 new elective modules.

Table 4. Transitional arrangement four specialization pathways

Finishing in the old curriculum after 31 August 2010 in general requires more study; taking (an) extra module(s) and handing in more assignments.

2.6. Teaching

The part-time variant of the UNIGIS curriculum is a distance learning course. This means very few contact hours with actual teaching are given during the course. The workshops, the UNIGIS Conference, some elective workshops and the summer-and winterschools are par excellence moments at which student can meet the tutors and at which actual lectures are given.

In order to support the distance learning student in his/her study activities, a virtual classroom has been created. Also, one or more MSc seminars will be organized when needed. Furthermore, a description of the study load and planning and a timetable for the whole curriculum is included below.

2.6.1. MSc Seminar and Virtual classroom

If we have a small group of students starting on the MSc programme at around the same time, we shall try to organize an informal MSc Seminar for the group. This will bring students and some staff together, and each student will make a short presentation of the research work he/she plans to undertake. On the staff side, we shall explain as much as possible about the MSc programme and we shall try to draw attention to the important issues involved in doing research and writing a dissertation. Questions and discussions will be encouraged, so that everyone should go home with a clearer idea of what is involved, and how different people are tackling their own project.

Within the Unigis website there is a protected area for part-time MSc students, where each student links his/her own web page with information about his/her own research project and how it is progressing.

2.6.2. Study load and planning

The UNIGIS part-time distance learning course (PgC, PgD, and MSc) totals 1680 hours of study: The first two years require 1064 hours (38 ECTS) while the MSc requires approximately 616 hours (22 ECTS). The PgC & PgD course will run for two years beginning March and September each year. The course calendar provides module dispatch and assessment completion dates (see timetable below). This calendar allows some flexibility, which is required for a distance-learning course that is designed for postgraduate, working students, though it also retains the necessary degree of control to ensure efficient course management. Modules each take two or two-and-a-half months to complete depending whether they are worth 4 or 5 ECTS. Upon delivery of the tutor-assessed assignments the student will get access to the next module through the personalised study centre on the Internet.

Although it is strongly advised to follow the course schedule, it is possible to have some flexibility in the schedule. This flexibility must be agreed between the student and the supervisor. Late submission of assignments can be allowed if external circumstances, such as pressures of work or personal life, mean that the strict assignment deadlines cannot be met. It is also possible to agree on a 'faster' schedule if the student has more time to spend on the study.

The timetable below gives the deadlines at which all assignments of a module have to be submitted. Students will only be allowed to carry assignments across a deadline with specific permission of the Amsterdam UNIGIS Organisation. Workshop dates are fixed, so please include them in your year planning.

The timetable supposes that you study 14 hours per week during the academic year (which is 10 months long). Distance learning means, however, that you manage your own time so you can allocate study times to suit yourself, depending on your workload and other activities, as long as you comply with the deadlines.

The MSc part of the programme covers one year. The student and the tutor will make a planning at the beginning of the programme. More information is provided in the MSc Study Guide (Study Guide part III) and optionally an MSc information session.

2.7. Examination Components part-time Programme

Please note that the ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT In the module descriptions below may change throughout a study year since module tutors regularly update the assignments. Therefore, always be sure to check the online module to see what the current assessment criteria or elements of assessment are for a specific module.

2.7.1. Postgraduate Certificate (PgC)

UNIT CODE NUMBER AND TITLE	P1-01 Advanced GI Science and Systems		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Environmental and Geographical Sciences, MMU		
UNIT LEADER(S)	Mathilde Molendijk, Jasper Dekkers		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	MANDATORY CORE: PgC/PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GIScience.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> • evaluate the different components of GIS/GIScience and their linkages, and develop critiques of the different approaches to contemporary GIS and GIScience; • analyse how spatial data models are used in the representation of geographical phenomena and evaluate the appropriateness of such models in particular applications; • explain the purpose, techniques and algorithms of spatial operations used in GIS and evaluate the constraints placed on their use by particular data types and models; • use of GIS software effectively and be able to implement appropriate analysis procedures for any given application. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with a deep understanding of the concepts and principles of GIS and be able to effectively employ GIS techniques in a real world context.</p> <p>GIS as a field of study - History and continuing evolution of concepts, issues and technologies in GIS. The components of GIS: Technology, Data, method, organisation and bodies of knowledge.</p> <p>Spatial data modelling - Spatial entities and geographical representation, ontology and semantic modelling, raster and vector encoding, object-oriented modelling, multi-dimensionality and representation in GIS.</p> <p>Spatial operations - Single and multiple layer operations and their algorithms, spatial interpolation and generation of continuous surfaces, applications and methods of network analysis, cartographic modelling.</p> <p>Practical experience with GIS - Introduction to the course GIS software using problem based learning. Raster and vector application exercises. Implementation of different spatial operations and analytical procedures.</p>			

TEACHING AND LEARNING STRATEGIES

The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.

Next to the Directed Reader, students will meet online with their tutor to discuss some module components and to monitor the progress on the group assignment.

Finally, opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.

ASSESSMENT STRATEGIES

Assessment is by coursework. There will be two assignments of equal weighting, the first assesses their defining of the field GIS by essay and the second assess the use of GIS by practical exercises.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1 – Essay (50%) (2,200 words)

The essay will concern a fundamental issue in the field of GIS related to its development, use and components. This group assignment will allow students to demonstrate learning outcomes related to topic knowledge and the use of skills such as literature searching, development of a coherent argument, academic writing, and citation/referencing.

Assessment 2 – Practical GIS assignment (50%) (report: 500 words, commentary: 500 words)

A software exercise concerning spatial modelling and spatial operations. The exercise will test software competency, and will be accompanied by critical commentary which will demonstrate learning outcomes related to spatial modelling and operations in addition to report writing skills.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES
AND COMMENTS

UNIT CODE NUMBER AND TITLE	P1-02 Database Theory		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Informatics, University of Huddersfield		
UNIT LEADER(S)	Ronnie Lassche		
CREDIT VALUE (ECTS)	4	STUDENT EFFORT (HOURS)	112
UNIT STATUS	MANDATORY CORE: PgC/PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students should be able to:</p> <ul style="list-style-type: none"> • design well formed database models, using appropriate design techniques, and be able to implement such designs using relational database software; • use SQL to establish and interrogate databases; • critically assess the limitations of conventional database structures as a means of storing spatial data; • critically assess current advances in database design for geographical applications. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with the practical skills to design, implement and interrogate relational databases together with the requisite knowledge to critically assess both current database models and developments of those models for geospatial data.</p> <p>The Database Approach - What is an information system? What is a database? Why are they necessary – generally and specifically for GIS? Database models; Reference architectures; Attribute data and spatial data.</p> <p>The Relational Model - Origins of the Relational model; Requirements of the Relational Model; Normalisation; EAR modelling; EEAR/UML modelling(introduction only); SLQ-99.</p> <p>Implementing a database - Designing and implementing a database; tutorial exercises.</p> <p>GIS and DBMS – current issues: A typology of GIS database architectures; limitations of the relational model for spatial data; the impact of OODBMS and ORDBMS; Universal servers; impact of web/web services; XML/GML. The ambition here is to provide a ‘management’ overview of current technology developments.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p> <p>Finally, the course tutor will give one or more online lectures to explain the course material in more detail and to offer students the opportunity to ask questions and to discuss the material with each other.</p>			

ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of equal weighting, the first assesses practical skills in designing and implementing a database and the second assesses the student's critique of limitations/current advances in database technologies.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 Design and implementation of a database (50%) (n/a words)</i> Students will be required to design, implement and document a database using an appropriate database package. This assignment tests the relation of the theory of database design – relational model, normal form, integrity constraints, EAR modelling, etc; to the practice of database implementation. Students will be required not only to implement an efficient database but also to evaluate in their reports how they arrived at their designs.</p> <p><i>Assessment 2 Paper (50%) (3000 words)</i> Students will be required to write a paper examining aspects of the (in)adequacy of conventional databases to store and retrieve spatial data efficiently. This assignment will differ from year to year but the purpose will always be to require the student to reflect upon what they have learnt about conventional databases and to consider what additional facilities might be needed to accommodate spatial data successfully.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	<p>A survey of current developments will be provided, so that students on all pathways will have an overview of emerging spatial database issues. Those students who wish to explore in greater technical depth may take the 'Databases for Enterprise GIS' unit.</p>

UNIT CODE NUMBER AND TITLE	P1-03 Geodata Capture, Standards and Quality		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	School of Environment and Life Sciences, University of Salford		
UNIT LEADER(S)	Alfred Wagtendonk		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	MANDATORY CORE: PgC/PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students should be able to:</p> <ul style="list-style-type: none"> • design and implement a strategy for capturing or sourcing spatial (geographical) data and accompanying metadata, • assess the impact of national and international data standards on the sourcing and availability of spatial (geographical data) data, • critically evaluate the potential impacts of data quality on spatial analysis and decision making, • specify fitness for purpose criteria and apply them to the evaluation of spatial (geographical) data for specific applications. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with the requisite knowledge and practical skills to source and evaluate, against recognised quality standards, data for use in Geographical Information-based projects and assess the quality of information output from those projects.</p> <p>Sourcing spatial data – focussing on how to identify sources of spatial data using discovery metadata, how to capture spatial data into a GIS and how to design a data capture strategy</p> <p>Data standards – identify the range of national and international data standards, introduce case studies on specific standards, assessment the impact standards have on the development of Spatial Data Frameworks at national and international levels.</p> <p>Data quality - define the different measures of data quality and how they might be assessed, introduce the concepts of spatial uncertainty, identify the sources of error in spatial data and how they might propagate when data is combined, consider the impact of data quality on spatial analysis.</p> <p>Evaluating fitness for purpose – the process by which the suitability of data for a specific application can be determined, the management of data quality within an organisation.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of equal weighting, the first assesses the student's evaluation of data strategies and the implications of data standards; the second assesses their evaluation of data quality for a particular application.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 Data sourcing analysis (50%) (3000 words)</i> Students will identify and evaluate issues relating to the sourcing of spatial data and in particular the impact of data standards and spatial data infrastructure initiatives.</p> <p><i>Assessment 2 Data quality evaluation (50%) (3000 words)</i> Students will evaluate the quality of data being used for a particular application. This evaluation will involved an assessment of the requirements of the project and the identification of relevant data quality issues.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	The unit will make extensive use of internet resources, reflecting the very rapid changes in the subject.

UNIT CODE NUMBER AND TITLE	P1-04 Research Methods		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Environmental and Geographical Sciences, MMU		
UNIT LEADER(S)	Chris Jacobs		
CREDIT VALUE (ECTS)	4	STUDENT EFFORT (HOURS)	112
UNIT STATUS	MANDATORY CORE: PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • assess the way in which issues relevant to GIS are researched and the results presented to the community; • discuss, critically, the range and appropriateness of research methods in GIS and the strengths and weaknesses of the data that they generate; • interpret data critically; • apply an integrating approach, including ethical and professional practice considerations, to designing a GIS based research project. 			
CURRICULUM OUTLINE			
<p>This unit aims to develop critical awareness of research design, data interpretation and presentation. It aims to achieve this through an understanding of the research methods of the natural and social sciences and the interactions between them in GIS applications.</p> <p>Research Design: problem statement, purposes and benefits. Theory, assumptions, validity and background literature. Variables and hypotheses. Data collection including ethical and professional practice considerations. Reporting results and outcomes: conclusions, interpretations and recommendation.</p> <p>Qualitative and Quantitative Techniques: Qualitative research, sampling, surveys, questionnaires, other methods, ethical issues. Critical appreciation of quantitative techniques such as univariate data analysis / statistics, bivariate statistics, tests for significance, correlation and regression. Data interpretation: natural / physical science data, social science data, secondary data, trend analysis, data mining, data quality and metadata.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES

Assessment is by coursework. There will be two assignments of equal weighting, the precise content may vary year by year but will typically include one based upon research design and a second based upon quantitative or qualitative methods of data interpretation and analysis.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1 Research Design (50% (1500 words))

Students will be assessed on their critical appraisal of a research design at postgraduate level.

Assessment 2 Data interpretation and Analysis (50%) (n/a words)

This will be case study based and students will be assessed on their critical evaluation of either a qualitative or quantitative data analysis/ interpretation study.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES
AND COMMENTS

UNIT CODE NUMBER AND TITLE	P1 -W2 Workshop II: Spatial Analysis				
TUTOR	Chris Jacobs, Mathilde Molendijk, Henk Scholten and others				
CONTRIBUTING DEPARTMENT	SPINlab Vrije Universiteit Amsterdam				
PREREQUISITES	modules P1-01, P1-02 and P1-03				
AIMS	<ul style="list-style-type: none"> - Application of the theory from modules 1 to 4 in a co-ordinated team exercise - Obtain practical experience with desktop GIS software (ArcView and/or GeoMedia) - Discuss broader and actual issues from the field of study - Foster student contact - Develop oral communication skills 				
INTENDED LEARNING OUTCOMES	<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> - apply the materials from modules P1-01, P1-02 and P1-03 - have obtained hands-on experience in using a GIS 				
WORKSHOP CONTENTS	<ul style="list-style-type: none"> - pre-workshop preparation - workshop exercise (approximately 15 hrs.) - lectures - presentation by guest speakers - presentation of workshop exercise by students 				
INDICATIVE TEACHING AND LEARNING ACTIVITIES (Hours for the Unit):	Directed Reading:	Practical/ Fieldwork:	Seminar/ Tutorial:	Student Centred Learning:	Total Student effort:
	6	15	8		28
ADDITIONAL NOTES AND COMMENTS	This workshop is part of the UNIGIS Annual Conference				

2.7.2. *Postgraduate Diploma (PgD)*

UNIT CODE NUMBER AND TITLE	P2-EM5/Sy1Mt1 GIS in Organisations		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Informatics, University of Huddersfield		
UNIT LEADER(S)	Bart Kusse		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	CORE OPTION: PgD/MSc GIS, PgD/MSc GIS and Management		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students should be able to:</p> <ul style="list-style-type: none"> critically analyse the importance of organisational issues in Geographical Information Systems development; discuss, critically, the importance of Information Systems Development methods (ISDMs) as a guide to developing successful information systems; use Soft Systems Analysis/Multiview to structure problem situations and analyse information systems requirements; explain the legal, ethical and professional issues that using GIS within and between organisations provoke. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with a critical understanding of the issues which arise in deploying GIS within organisations and the practical methodologies used to address these issues.</p> <p>Organisational issues and GIS - <i>From Technocentric to socio-technical computing</i>: why systems fail; the declining significance of technical failure; the rise of socio-technical approaches to Information Systems (IS) development. <i>IS within Organisations</i>: IS planning within modern organisations; distinction between IS requirements and IT requirements; the roles of IS at different levels of organisations; generic benefits; where GIS fit into corporate planning.</p> <p>ISDMs - <i>A 'generic' GIS methodology</i>: the 'waterfall' model; feasibility studies; user needs requirements; pilot studies; Cost-Benefit-Analyses; risk analysis; limitations of pragmatic approaches. <i>Alternative ISDMs</i>: the variety of alternative ISDMs; the importance of the socio-technical tradition; Soft Systems Analysis; the Multiview Methodology.</p> <p>Peopleware: the importance of organisational context; the impact of individuals upon projects; the impact of corporate cultures; the importance of organisational politics; legal and ethical frameworks.</p> <p>GIS beyond organisations: the 'human' challenges on inter-organisational GIS; GIS for the public – Public Participation GIS (PPGIS) and community GIS.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and</p>			

<p>essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>	
<p>ASSESSMENT STRATEGIES</p> <p>Assessment is by coursework. There will be two assignments of equal weighting, the first assesses the student's analysis of organisational issues by reflection and the writing of an essay; the second assess the practical application of development methodologies.</p>	
<p>ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT</p> <p><i>Assessment 1. Essay assignment (50%) (3000 words)</i> An assignment will be set which will require students to reflect upon the importance of aspects of the 'human/organisational' environment within which GIS operate. Likely topics include:- 'GIS and Ethics'; 'Legal issues in GIS'; 'GIS and the public'; etc.</p> <p><i>Assessment 2. Soft-systems/Multiview analysis (50%) (n/a words)</i> This assignment will be offered in two formats (students undertake one):- (i) <i>Distance-learning assignment:</i> a Soft Systems exercise, based upon a case study, work-based system. (ii) <i>An optional workshop project.</i> Students who elect to attend a workshop will be asked to form project teams and to use Soft Systems/Multiview to analyse the information needs within a prepared case-study and to make recommendations about IS technologies that may be required to meet such needs.</p>	
<p>INDICATIVE STUDENT LEARNING RESOURCES</p> <p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
<p>ADDITIONAL NOTES AND COMMENTS</p>	

UNIT CODE NUMBER AND TITLE	P2-EM5/Sc1 Programming and Modelling for GIS		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Environmental and Geographical Sciences, MMU		
UNIT LEADER(S)	Nancy Omtzigt, Nils de Reus		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	CORE OPTION: PgD/MSc GI Science. <i>ELECTIVE: PgD/MSc GIS</i>		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> • discuss, critically, software engineering concepts, methods and practices; • program small scale GIS based applications in Visual Basic or Java; • critically evaluate methodologies for modelling; • analyse the GIS-model interaction and prepare/implement outline designs for modelling with GIS. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with a critical understanding of the issues involved in designing and implementing software and GI based models. In addition it aims to enable students to write small scale GIS applications and design GIS based models.</p> <p>Programming and quality – programming languages, data types, style, portability, object oriented programming, UML. Software engineering concepts – specification, design, planning, software tools, testing, performance analysis, documentation and control.</p> <p>Programming Tutorial – (Visual Basic and Java) a practical course in programming in Visual Basic with emphasis on interaction with API of GIS software – e.g. IDRISI. Java as an interoperable language.</p> <p>Models and modelling – the concept of models in science and operations. Strategies and design, rule-based/simple logic models, empirical/statistical, dynamical models, programming models.</p> <p>GIS-Model interaction – data model, updating and automation, visualisation, systems approach, issues in GIS hosted modelling: interpolation, thresholds, hybrid systems and component failure/system reliability.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. This will be supplemented by a self-learning Programming textbook with associated software. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES

Assessment is by coursework. There will be two assignments of equal weighting, the first assesses the student's analysis of quality issues in programming by means of a critical essay and the second assesses their implementation of GIS-model issues by requiring them to either develop or analyse a GIS based model.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1 Software Quality Essay (50%) (3000 words)

Students will be assessed on their critical understanding of good software development methods by, for example, a critical analysis of the object oriented paradigm.

Assessment 2 GIS-model design (50%) (n/a words)

Students will be assessed on a critical reflection on their own design for (or a critical analysis of an existing) GIS based model. This may include implementation using Visual Basic or Java.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES
AND COMMENTS

UNIT CODE NUMBER AND TITLE	P2-EM5/Sc2 Databases for Enterprise GIS		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Informatics, University of Huddersfield		
UNIT LEADER(S)	Ronnie Lassche		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	CORE OPTION: PgD/MSc GI Science. <i>ELECTIVE: PgD/MSc GIS</i>		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
On completion of this unit students should be able to:			
<ul style="list-style-type: none"> critically assess the organisational benefits and challenges of developing 'Enterprise GIS' systems; evaluate the advantages and disadvantages of holding geographical data in ORDBMS; critically discuss the importance of OGC and SQL99 spatial/MM; implement a simple geo-database, using a spatial extended ORDBMS. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with a critical understanding of the issues in building GIS databases for Enterprise GIS together with the necessary skills to implement a small geo-database using current standards/technologies.</p> <p>From desk-top to Enterprise GIS: The organisational advantages and dangers of adopting Enterprise GIS strategies. Limitations of Desk-top technologies. Limitations of Relational databases. Alternative enterprise strategies -universal storage vs universal access. Spatial Information Management.</p> <p>The technologies that underpin EnterpriseGIS: The promise and limitations of Object Oriented databases. Failure in the market. The rise of Universal servers (ORDBMS). Requirements for a spatially extended ORDBMS. Passive and active servers.</p> <p>The standards that underpin EnterpriseGIS: Limitations of vendor specific spatial extensions. The role of standards bodies – e.g. OGC. SQL99 – the Object Relational Standard. SQL99 MM/Spatial – the standard for spatial servers. The XML/GML standard. XDBMS.</p> <p>A Spatial ORDBMS tutorial: Experience of establishing and interrogating a spatially extended database.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an</p>			

online bulletin board.	
ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of equal weighting, one will assesses the student's analysis of key issues – benefits/challenges of enterprise GIS, ORDBS evaluation -by requiring answers to set of targeted questions to be written up as a workbook; the other will assess practical skills and the understanding of concepts by requiring the development of a working geo-database.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 – Workbook (50%) (n/a words)</i></p> <p>Students will answer a series of targeted questions on the organisational benefits and challenges of developing Enterprise GIS. Critical assessment of the advantages/disadvantages of ORDBMS for geodata will be assessed.</p> <p><i>Assessment 2 – Geo-database design and implementation (50%) (n/a words)</i></p> <p>Students will be assessed on their application of principles in designing a Geo-database, and effectiveness in implement their design using an spatially extended RDBMS.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.</p> <p>See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	

UNIT CODE NUMBER AND TITLE	P2-EM5/Mt2 GIS Project Management		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Environmental and Geographical Sciences, MMU		
UNIT LEADER(S)	Bart Kusse		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	CORE OPTION: PgD/MSc GIS and Management. <i>ELECTIVE: PgD/MSc GIS</i>		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • identify and critically analyse the issues involved in organising, planning, monitoring and controlling a GIS project; • initiate a small scale GIS project, by developing project plans and financial budgets, assessing project costs and benefits, developing investment appraisal methods and using authorisation, monitoring and controlling processes; • discuss the role, significance and impact of people in a project management setting and evaluate and implement strategies for managing people in projects; • review current GIS Project Management methodologies and appraise their effectiveness and adaptation to managing different types of GIS projects. 			
CURRICULUM OUTLINE			
<p>The unit aims to develop project management skills through a critical understanding of the concepts, principles and use of project management tools.</p> <p>Issues in GIS project management – strategy, project environment, the investment process, appraisal methods and justification. Project constraints, influencing factors and project risk analysis. GIS project life cycle, project scope, objectives, plans, budgets, requests for change, risk analysis, and contract tendering.</p> <p>Running a GIS project - fundamentals and levels of control, monitoring and control, control techniques, business and technical integrity, time and financial controls, earned value analysis, progress reporting, project meetings, exception plans and project closure.</p> <p>People issues - highlighting issues centred on people in projects, project leadership, team building, motivation and development of team members.</p> <p>Methodologies - overview of current GIS Project Management Methodologies.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of equal weighting based on case studies, the first assesses the student's analysis of project management issues via a critical report; the second will assess project management skills by requiring the development of project plans - for example resource plans and these will including people issues.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 – Critical Report (50%) (3000 words)</i></p> <ul style="list-style-type: none"> the critical analysis of project management issues and methodologies; the analysis of 'people in project' issues, their influencing factors, project politics and communication issues. <p><i>Assessment 2 – Project Plans (50%) (n/a words)</i></p> <ul style="list-style-type: none"> the effective utilisation of project management monitoring control techniques, financial appraisal and risk analysis; <p>the appropriateness of the project resource and financial plans and reports.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	The Directed Reader is written by a professional practioner and the unit includes case studies derived from professional experience.

UNIT CODE NUMBER AND TITLE	P2-EM5/En1 Environmental Impact Assessment & GIS		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	School of Environmental and Life Sciences, University of Salford		
UNIT LEADER(S)	Eric Koomen		
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS)	140
UNIT STATUS	CORE OPTION: PgD/MSc GIS and Environment. <i>ELECTIVE: PgD/MSc GIS</i>		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • define, describe and critically analyse the EIA process; • demonstrate a competent knowledge of the critical parameters that contribute to a successful EIA; • identify the interaction and integration of social and environmental assessments; • evaluate recent trends and future prospects for the application of GIS in social and environmental assessments. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide a historic and contemporary planning background to EIA, a knowledge of the concepts and techniques utilized in the EIA process, and assessment as related to specific environmental parameters.</p> <p>EIA – the need for EIA, history, planning background, concepts and definitions for EIA, EIA procedure vs EIA process, case study.</p> <p>Critical parameters – highlighting the critical parameters that contribute to a successful EIA.</p> <p>Integration of elements – introduction to the integration of social and environmental assessments.</p> <p>Recent trends – highlighting the application of GIS in social and environmental assessments.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES

Assessment is by coursework. There will be two assignments of equal weighting, the precise content may vary year by year but will typically include a case study based analysis of the impacts and a design/examination of a design for GIS support of EIA.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1 – Analysis (50%) (3000 words)

- critical assessment of the EIA process;
- identification of the critical parameters in the process.

Assessment 2 – Design (50%) (3000 words)

- critical discussion of the social impact assessment process;
- critical evaluation of the contemporary working of EIA through a case study – including GIS design, environmental model and presentation/participation issues.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES
AND COMMENTS

UNIT CODE NUMBER AND TITLE	P2-EM5/En2 Remote Sensing for GIS Applications	
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network	
HOME DEPARTMENT	School of Environment and Life Sciences, University of Salford	
UNIT LEADER(S)	Marieke Eleveld	
CREDIT VALUE (ECTS)	5	STUDENT EFFORT (HOURS) 140
UNIT STATUS	CORE OPTION: PgD/MSc GIS and Environment. <i>ELECTIVE: PgD/MSc GIS</i>	
PRE-REQUISITES	None	
UNIT LEARNING OUTCOMES		
<p>On completion of this unit, students will be able to:</p> <ul style="list-style-type: none"> • explain the principles of remote sensing and evaluate the strengths and weakness of data from different remote sensing systems; • discuss, critically, the principles of information extraction from remotely sensed data; • generate environmental information from remotely sensed data and appreciate the importance of selecting data appropriate for a given task; • critically evaluate methods for integrating remotely sensed data with GIS. 		
CURRICULUM OUTLINE		
<p>This unit aims to provide students with a broad insight into the sources, applications and future potential of remote sensing data for GIS applications. The unit comprises four components:</p> <p>Principles of remote sensing - highlighting the principles of remote sensing including interactions between electromagnetic radiation, atmosphere and surface, but with particular emphasis on land surface characteristics.</p> <p>Satellite systems - describing of a range of satellite systems, their spectral, spatial and temporal characteristics and range of applications</p> <p>Quantitative Data - examining the extraction of quantitative data from remotely sensed images including the development and application of image-based data extraction techniques, spectral indices, and application of canopy reflectance models</p> <p>GIS Integration - highlighting the key issues in the integration of remotely sensed data in GIS, addressing issues of spatial scale, data availability and information content.</p>		
TEACHING AND LEARNING STRATEGIES		
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>		

ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of equal weighting, the precise content may vary year by year but will typically include a piece of work requiring students to carry out practical work with remotely sensed images and a review paper on a particular application of remote sensing.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 Remotely Sensed Image (50%) (n/a words)</i></p> <p>Students will be assessed on the manipulation of, and data extraction from, a remotely sensed image data set, including ancillary data.</p> <p><i>Assessment 2 Review Paper (50%) (3000 words)</i></p> <p>Students will be assessed on the critical evaluation of the use of remote sensing and integration in GIS in a specific application area.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.</p> <p>See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	

2.7.3. Non-core modules (PgD Electives)

UNIT CODE NUMBER AND TITLE	P2-EM41 GIS for Society		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Environmental and Geographical Sciences, MMU		
UNIT LEADER(S)	Chris Jacobs		
CREDIT VALUE (ECTS)	4	STUDENT EFFORT (HOURS)	112
UNIT STATUS	ELECTIVE: PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> demonstrate how GIS can be used to address the spatial dimension of different issues affecting contemporary society; critically evaluate the suitability of secondary data sets and spatial analysis methods for investigations into spatial variation in the social landscape before formally implementing these measures in a GIS-based application. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with the appropriate skills to employ GIS effectively in social science applications.</p> <p>GIS in the social sciences - the unit will review how GIS is used to investigate spatial processes (at different scales) within the social landscape. Major issues such as data availability/limitations and methods of spatial analysis will be highlighted as well as a review of recent applications of GIS in different contexts.</p> <p>Working with census, geodemographic and other socioeconomic data - students will be introduced to the variety of different spatial and other data sets available to the social scientist. Special focus will be given to the UK Census. Students will learn how to access secondary data sets, including the Census, and bring these into GIS environments for further analysis. Students will also critically examine the suitability of these data sets for the investigation of spatial variation in lifestyle, health and socio-economic status.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. Students will undertake a mini-project utilising geodemographic, socio-economic or census data which will require them to devise strategies for investigation, analysis and presentation.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 Mini-project (100%) (n/a words)</i> A1 size poster presentation.</p> <p>Students will be assessed on the analysis, discussion and presentation of their results in poster format.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ADDITIONAL NOTES AND COMMENTS	

UNIT CODE NUMBER AND TITLE	P2-EM42 Visualisation and GIS		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Environmental and Geographical Sciences		
UNIT LEADER(S)	Eduardo Dias		
CREDIT VALUE (ECTS)	4	STUDENT EFFORT (HOURS)	112
UNIT STATUS	ELECTIVE: PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
On completion of this unit students should be able to:			
<ul style="list-style-type: none"> critically discuss the visual presentation of spatial data, drawing on the principles of the cognitive-semiotic framework; create and analyse outline designs for GIS visualisations in the context of a multimedia, internet computing environment. 			
CURRICULUM OUTLINE			
<p>This unit aims to provide students with a critical understanding of issues in visual perception, the influence of these on design for GIS visualisation and possibilities for the future.</p> <p>Human perception and mapping – the cognitive-semiotic framework - eye, brain, vision and processes of perception. Recognition, discrimination, pattern and form and the role of ideas. Spatial cognition. Spatial information and human interaction with graphic and cartographic objects. Cartographic design.</p> <p>GIS and visualisation - Human computer interaction. Computer graphic systems and design of computer graphics. Representation of 2D and 3D worlds. Animation. GIS, the internet and multimedia.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			
ASSESSMENT STRATEGIES			
<p>Assessment is by coursework. There will be one assignment which assesses the student's knowledge of the interaction between perception and mapping by requiring them to design and</p>			

then critique a GIS visualisation.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1 Map Design and Critique (100%) (n/a words)

Students will be assessed on their application of the principles and concepts in geo-visualisation to a design for some particular context. They will also have to provide a critique of the design, within the cognitive-semiotic framework, and may focus on a particular element, e.g. colour use.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES AND COMMENTS

The assignment reports for this module must be written in English.

UNIT CODE NUMBER AND TITLE	P2-EM43 Internet GIS		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Informatics, University of Huddersfield		
UNIT LEADER(S)	Ronnie Lassche		
CREDIT VALUE (ECTS)	4	STUDENT EFFORT (HOURS)	112
UNIT STATUS	ELECTIVE: PgD/MSc GIS; PgD/MSc GIS and Management; PgD/MSc GIS and Environment; PgD/MSc GI Science.		
PRE-REQUISITES	None		
<p>UNIT LEARNING OUTCOMES</p> <p>on of this unit students should be able to:-</p> <ul style="list-style-type: none"> critically assess the organisational benefits and challenges of developing web and wireless GI systems; evaluate the technologies that underpin InternetGIS; explain the importance of standards, e.g. OGC and GML; implement a simple GML application. 			
<p>CURRICULUM OUTLINE</p> <p>This unit aims to provides students with the knowledge and practical skills to design and implement distributed GIS services according to current industry standards building in concepts such as OpenGIS standards to future proof such implementations.</p> <p>From Desk-top GIS to Distributed GI Services -The demand-pull and technology push behind the development of GI services. Desk-top to enterprise deployment. Universal delivery. GIS leaves the building. Case studies, e.g. public participation GIS; location/mobile services.</p> <p>The technologies that provide Distributed Web Services - The evolution of the web; the technologies that facilitate distributed web-services; the technologies that enable wireless/mobile services.</p> <p>Building the GeoWeb - Evolution of webGIS technologies; client and server solutions; the OpenGIS specification; ISO standards.</p> <p>A GML tutorial - Creating a simple GML application schema and GML application instances.</p>			
<p>TEACHING AND LEARNING STRATEGIES</p> <p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and the summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>			

ASSESSMENT STRATEGIES

Assessment is by coursework. There will be two assignments of equal weighting, the first assesses the student's evaluation of the organisational and technological challenges of internet GIS by construction of a workbook in response to a series of targeted questions; the second will assess, via a practical demonstration, their implementation of current standards for distributed GIS.

ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT

Assessment 1. Workbook assignment (50%) (n/a words)

An assignment will be set which will require students answer a series of questions that will assess their knowledge and critique of the technologies involved in web and wireless GI systems.

Assessment 2 – Geo-web schema design and implementation (50%)(n/a words)

Students will be required to create an XML schema and sample instances and will be assessed on their implementation of standards.

INDICATIVE STUDENT LEARNING RESOURCES

The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references.

See the online module for more information on the primary and recommended reading material.

ADDITIONAL NOTES
AND COMMENTS

UNIT CODE NUMBER AND TITLE	P2-EM44 Spatial Analysis of Health		
BRIEF SUMMARY	This unit provides a broad range of theory, ideas, techniques and knowledge. The central aim is to help students to understand the role of geographical and spatial thinking in an epidemiological and medical context. To understand how GIS and remote sensing provide valuable tools for problem solving by example.		
HOME PROGRAMME	Distance Learning Postgraduate GIS Network (UNIGIS)		
HOME DEPARTMENT	Environmental & Geographical Sciences, MMU		
UNIT LEADER(S)	Chris Jacobs		
CREDIT VALUE (ECTS)	4		
STUDENT EFFORT (HOURS)	112	LEARNING OPPORTUNITIES (HOURS)	Learning Materials: 25 hrs
			Independent Learning: 87 hrs
UNIT STATUS	ELECTIVE: PgD/MSc GIS, PgD/MSc GIS and Environment, PgD/MSc GIS and Management, PgD/MSc GI Science		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
On completion of this unit students should be able to:			
<ul style="list-style-type: none"> Review how current GIS and remote sensing theories and techniques can be applied to epidemiology, in particular the analysis of factors affecting major diseases Apply appropriate knowledge of spatial health data analysis and methods for the creation of disease risk maps to aid in the management and modelling of serious human illnesses. 			
CURRICULUM OUTLINE			
Basic epidemiological methods, health data types, clinical and environmental factors relating to major diseases.			
Background and history, spatial data and data models, derivation of proxies of biophysical parameters, spatial analysis and GIS, pattern analysis, data mapping, cartographic design and visualisation.			
Case study examples of malaria and meningitis examining socio-economic and environmental factors.			
Implementation of data and methods for the creation of disease risk maps and GIS models/visualisations appropriate for the management of serious disease.			
TEACHING AND LEARNING STRATEGIES			
The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and			

<p>essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>	
<p>ASSESSMENT STRATEGIES</p> <p>Assessment is by coursework. There will be two assignments of equal weighting, the first assesses the student's understanding of concepts, theories and ideas relating to spatial health data analysis by means of a critical essay (approx 1500 words) and the second assesses their implementation of remote sensing and GIS model issues by requiring them to use appropriate GIS methods and techniques for the creation of a risk map product.</p>	
<p>ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT</p> <p>The assessment for this unit will include a mixture of student-centred formative and summative elements to test the achievement of the stated learning outcomes. Students will be assessed on their ability to correctly collect, interpret and analyse spatial health data. They will also be required to demonstrate an ability to present and visualise new risk data. Students will also be assessed on their ability to demonstrate their understanding of theoretical concepts of GIS and earth observation.</p>	
<p>INDICATIVE STUDENT LEARNING RESOURCES</p> <p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
<p>ANY ADDITIONAL NOTES AND COMMENTS</p>	

UNIT CODE NUMBER AND TITLE	P2-EM45 Spatial Health in Practice		
BRIEF SUMMARY	The aim of this unit is to evaluate which spatial theories and Geographical Information System (GIS) methods are appropriate, and can be used effectively, to investigate real-world health problems. Students will be introduced to how real-world health and disease problems are addressed from organisational, management, spatial GIS, emerging technologies, environmental information and modelling perspectives.		
HOME PROGRAMME	Distance Learning Postgraduate GIS Network (UNIGIS)		
HOME DEPARTMENT	Environmental & Geographical Sciences, MMU		
UNIT LEADER(S)	Chris Jacobs		
CREDIT VALUE (ECTS)	4		
AMOUNT OF STUDENT EFFORT (HOURS)	112	LEARNING OPPORTUNITIES (HOURS)	Directed Reader: 65 hours
			Assessment/ Independent study: 47 hours
UNIT STATUS	ELECTIVE: PgD/MSc GIS, PgD/MSc GIS and Environment, PgD/MSc GIS and Management, PgD/MSc GI Science		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
On completion of this unit students should be able to:			
<ul style="list-style-type: none"> • Apply appropriate practical spatial methods and techniques within a GIS to tackle health management and delivery issues based on scenarios • Demonstrate an understanding of how appropriate spatial methods, technologies and theory might be employed to solve health and disease issues. 			
CURRICULUM OUTLINE			
This unit provides case study examples which illustrate a range of spatial GIS methods, techniques, management approaches and models in the context of healthcare delivery and epidemiological investigations.			
The central aim is to help students to understand how real-world health and disease problems make use of organisational, management, spatial GIS, emerging technologies, environmental information and models.			
Focussed case-studies are used as exemplars in how GIS and organisational methods are employed			
Organisations across a variety of spatial scales, in-hospital and mobile medical asset monitoring, communicable diseases and emerging diseases are discussed.			
Students will be given the opportunity to implement these useful skills and methods to tackle scenarios which require some or all of the case-study methods and techniques.			

TEACHING AND LEARNING STRATEGIES	
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>	
ASSESSMENT STRATEGIES	
<p>Assessment is by coursework. There will be two assignments of 70% and 30% weighting. Assignment one (worth 70%) refers to the first learning outcome and assesses the student's ability to implement a range of appropriate spatial analysis techniques and methods with a GIS to tackle a problem based around case study examples (approx 2500 words). The second assignment, worth 30%, examines the second learning outcome, testing the student's understanding of relevant concepts, theories and ideas relating to spatial health data analysis by means of a critical essay based around a case study scenario (approx 1000 words).</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p>The assessment for this unit will include a mixture of student-centred formative and summative elements to test the achievement of the stated learning outcomes. Students will be assessed on their ability to correctly analyse and interpret spatial health data for the purpose of solving a set case-study problem. They will also be required to demonstrate an ability to summarise and prioritise their understanding of relevant ideas and techniques related to a case-study problem. Students will also be assessed on their ability to demonstrate how GIS and appropriate technologies can be used effectively within the health arena. Specific assessment criteria are presented in the Online module.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ANY ADDITIONAL NOTES AND COMMENTS	

UNIT CODE NUMBER AND TITLE	P2-EM5EU European aspects of GIS		
BRIEF SUMMARY	<p>The aim of this unit is:</p> <ul style="list-style-type: none"> • To familiarize students with the European dimension of GI • To qualify students to successfully work on the European scene <p>The theme of the module is: Towards European Spatial Information Structures.</p>		
HOME PROGRAMME	Distance Learning Postgraduate GIS Network (UNIGIS)		
HOME DEPARTMENT	Department of Spatial Economics, Vrije Universiteit Amsterdam		
UNIT LEADER(S)	Eric Koomen		
CREDIT VALUE (ECTS)	5		
AMOUNT OF STUDENT EFFORT (HOURS)	140	LEARNING OPPORTUNITIES (HOURS)	Directed Reader: 90 hours
			Assessment/ Independent study: 50 hours
UNIT STATUS	ELECTIVE: PgD/MSc GIS, PgD/MSc GIS and Environment, PgD/MSc GIS and Management, PgD/MSc GI Science		
PRE-REQUISITES	None		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> • that there is a need for international information at various scales • understand the problems associated with crossing borders in European Datasets • which European datasets are available and which initiatives are in place to create missing datasets • how to locate and combine geographical data in Europe and know about data catalogues, spatial reference systems, metadata and standards • which technological developments are taking place in the European GI-field and what their impact on the European GIS community might be • what is necessary to set up a Geographical Information Infrastructure (GII) in Europe • which problems and issues are faced in setting up a European GII and what has already been done in realizing a common infrastructure • how can the GI community make a European GII work. 			
CURRICULUM OUTLINE			
<p>The European aspects of GI module has a different structure than most other UNIGIS-modules, it consists of a collection of relevant literature and connecting text in the digital learning environment Blackboard. As a pedagogical help the aims and objective of each section will be stressed. Self-assessed assignments are available throughout the module to help students interactively test their knowledge. This learning module is a compulsory unit of the European Masters in GIS program, see http://www.euomastergi.org/.</p>			

TEACHING AND LEARNING STRATEGIES	
<p>The learning and teaching strategies are student centred. They aim to encourage a deep-learning approach by using reflection and self-evaluation. A written Directed Reader will be provided on-line, which will provide the essential background, the framework for study and essential detail. It will include self assessment exercises. Each section of this Reader will be framed with a context setting introduction, clearly identified learning outcomes and additional reading within the academic and professional literature. Students will be required to reflect on their learning as part of the self assessment exercises and summative assignments. Opportunities for students to discuss issues with staff and fellow students will be provided via an online bulletin board.</p>	
ASSESSMENT STRATEGIES	
<p>Assessment is by coursework.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resource will be the Directed Reader supplemented by a mixture of academic journal and professional references. See the online module for more information on the primary and recommended reading material.</p>	
ANY ADDITIONAL NOTES AND COMMENTS	<p>This module can be chosen as module 7 or 8 instead of a 4 ECTS elective module in the PgD programmes.</p>

UNIT CODE NUMBER AND TITLE	P2-W3 Workshop III: GI(S) and Decision Making			
TUTOR	Nancy Omtzigt, Eric Koomen, Jasper Dekkers, Henk Scholten, and others			
CONTRIBUTING DEPARTMENT	SPINlab Vrije Universiteit Amsterdam			
PREREQUISITES	Modules P1-01, P1-02, P1-03 and P1-04. Further, both 5 ECTS core-modules from any the Diploma-part of the Programme			
AIMS	<ul style="list-style-type: none"> - Application of parts of the theory from all modules in a coordinated team exercise - To create a better understanding of the role and possibilities of GIS in decision making processes - Develop oral communication and negotiation skills using your GIS knowledge - Foster student contact 			
INTENDED LEARNING OUTCOMES	<p>On completion of this unit students should be able to:</p> <ul style="list-style-type: none"> - apply the materials from all modules followed - apply GIS at a well-considered way - compare various policy alternatives using weighted summation 			
WORKSHOP CONTENTS	<ul style="list-style-type: none"> - Pre-workshop preparation - Lectures - Presentation by guest speakers - Excursion - Exercises - Presentation of workshop exercise by students 			
INDICATIVE TEACHING AND LEARNING ACTIVITIES (Hours for the Unit):				
Directed Reading:	Practical/ Fieldwork:	Seminar/ Tutorial:	Student Centred Learning:	Total Student effort:
6	15	8		28
ADDITIONAL NOTES AND COMMENTS	This workshop is part of the UNIGIS Annual Conference.			

2.7.4. *Master of Science in GIS (MSc)*

UNIT CODE NUMBER AND TITLE	P3-MSc MSc Project and Dissertation		
HOME PROGRAMME	PgC/PgD/MSc by Distance Learning GIS Network		
HOME DEPARTMENT	Department of Spatial Economics, Vrije Universiteit Amsterdam		
UNIT LEADER(S)	Jasper Dekkers		
CREDIT VALUE	22		
STUDENT EFFORT (HOURS)	616	CLASS CONTACT TIME (HOURS)	Directed Learning 8 hrs (Optional Workshop)
UNIT STATUS	MANDATORY CORE: MSc GIS; MSc GI Science; MSc GIS and Management; MSc GIS and Environment.		
PRE-REQUISITES	PgD completed		
UNIT LEARNING OUTCOMES			
<p>On completion of this unit, students should be able to:</p> <ul style="list-style-type: none"> • plan, design and execute an advanced, independent investigation; • undertake data gathering with due regard for safety and risk assessment and ethical standards; • synthesize and interpret results/outcomes in the context of the relevant peer reviewed literature; • present the outcomes in the form of a coherently argued and well constructed dissertation including critical reflection on the process of undertaking the research project and applying research methodologies. 			
CURRICULUM OUTLINE			
<p>This unit aims to enable students to design and execute an original/ independent study in their field of GIS and in doing so to develop an in-depth knowledge of the relevant GIS literature and research activities in that field.</p> <p>Applicable to the award undertaken – the project outline will demonstrate the appropriateness to the philosophy of the award. Students will be required to consider the planning of their research programme, time management, health and safety and ethical considerations and the project outline will also require evidence of researching the literature. Guidance on the presentation of the dissertation will be provided.</p>			
TEACHING AND LEARNING STRATEGIES			
<p>The MSc project is student directed. The preparative programme/workshop will examine the whole process for the MSc project from problem definition to dissertation writing. This will be integrated with the assessments which will ensure (a) appropriate aims and objectives for the research project; (b) effective literature use and presentation of the project outcomes. An optional workshop covering these issues will be held at the beginning of the MSc stage but all students will be issued with a MSc guide covering this material.</p>			

ASSESSMENT STRATEGIES	
<p>There will be two unequal assessments; a project outline (10%) which examines their research design and the MSc Dissertation (90%) which examines implementation, 'data gathering', analysis and presentation.</p>	
ASSESSMENT CRITERIA FOR UNIT/ELEMENTS OF ASSESSMENT	
<p><i>Assessment 1 Project Outline (10%) (2000 words)</i></p> <p>Students will be assessed on how well formulated the research /problem statement is, including aims and objectives, risk/safety assessments and ethical considerations.</p> <p><i>Assessment 2 MSc Dissertation (90%) (15,000 max words)</i></p> <p>Assessment is based on the critical review of the research question and the literature; implementation, analysis and presentation of research in the dissertation.</p>	
INDICATIVE STUDENT LEARNING RESOURCES	
<p>The primary resources will be the directed student reader covering the undertaking of MSc projects and an MSc workshop (Study Guide part III). These will be supplemented by a mixture of academic journal references, on-line material and texts.</p>	
ADDITIONAL NOTES AND COMMENTS	

Appendix I. Module Assessment Form

UNIGIS postgraduate diploma in GIS		Grade	
Student Name:			
		Intake:	
Module			
Number			
.....Name.....			
Assessed by			
Supervisor	<i>Prof. dr H.J. Scholten</i>	Date and signature:	
Module tutor	Date and signature:	
Marking profile			
	10 - excellent	poor - 1	Remarks
Form			
Structure and organisation	●	●	
Style and grammar	●	●	
Visual presentation	●	●	
Referencing	●	●	
Content			
Correct answers to the assignments	●	●	
Analytical approach	●	●	
Critical and balanced treatment of subject	●	●	
Originality	●	●	
Coherent conclusion	●	●	
Adequate use of sources	●	●	
Notes			
