

ITC
Study guide
2008/2009/2010

Governance and Spatial
Information Management

ITC Study Guide

Governance and Spatial Information Management

2008 / 2009 / 2010

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Master of Science Course Code: C08-GSIM-MSc-01

Foreword

Dear course participants,

Welcome to ITC.

Having left your family and country, you have come to ITC to further your education. We hope that the course you have selected will fulfil your expectations.

Education at ITC is characterised by:

- a modular set-up,
- a mixture of theory and practice, often including participants' own experiences
- a core curriculum for Remote Sensing (RS) and Geo-information Systems (GIS), common to all programmes, and
- choice options according to individual (research) interest and/or the needs of your own organisation.

We are pleased to present you this study guide for the 2008/2009 courses offered full-time at ITC Enschede. This study guide gives you information on the courses, an overview of the modules and the detailed content of the course modules. ITC is continuously modifying its courses to the needs of its students and their organisations. The structure of the MSc courses was adjusted last year in order to strengthen the links between the courses and the research projects, implemented by ITC.

Description of all elements of education at ITC and the descriptions of the modules of other courses are available on the ITC website (<http://www.itc.nl/education/courses/modules.aspx>).

But there is more to life at ITC than only education. You have arrived at an institute with more than 400 students from over 70 countries. Furthermore, also the ITC staff is originating from more than 30 countries: a truly international environment where you will be able to meet colleagues from all over the world. ITC is organising all sorts of social, cultural and sports activities. Well-known are the International Sports Tournament, the International Food Festival and the International Cultural Event. We would like to encourage you to participate in these events and to make new friends in the process.

We will do our best to provide you with the quality of education that you expect from our institute.

We wish you the best of success during your studies and a pleasant stay at ITC and in The Netherlands.

Prof. Dr. Ir. M. Molenaar, Rector ITC

Introduction to ITC

One of humanity's greatest challenges is to achieve an appropriate balance between the development of natural resources and the maintenance of an optimal natural environment. To meet this challenge we need information on the earth's surface and sub-surface: spatially referenced information or *geo-information*.

Many different types of *earth observation* provide efficient ways of gathering geo-information. These types include conventional photographic and non-photographic imaging techniques, electro-optical sensing of the wider spectrum by multi-spectral, thermal infrared and radar scanning as well as geophysical and geochemical data-acquisition techniques. All these methods are used in mapping the earth's topography, monitoring the natural environment and exploring for natural resources and all are applied by specialist groups within the Institute.

ITC specializes in the collection, management and visualisation of geo-information and its integrated interpretation in support of resource management and policy development. In this way, scientific earth observation supports decision-making for sustainable development and the alleviation of poverty in the developing world.

The International Institute for Geo-Information Science and Earth Observation was established in 1950, and is usually referred to as ITC because of its original name: International Training Centre for Aerial Survey. It is the largest institute for international higher education in the Netherlands.

ITC is an autonomous organisation operating under the accountability of the University of Twente, and is funded by the Ministry of Education, Cultural Affairs and Science of the Netherlands. ITC is subject to the national quality assurance procedure for universities in the Netherlands. It is based in Enschede. ITC's main activities are education, research and advisory services. These activities are carried out by six scientific Departments:

- Department of Earth Observation Science (EOS)
- Department of Earth Systems Analysis (ESA)
- Department of Geo-information Processing (GIP)
- Department of Urban and Regional Planning and Geo-information Management (PGM)
- Department of Natural Resources (NRS)
- Department of Water Resources (WRS)

They are supported by the education-, research-, consultancy- and general support departments.

Education

ITC has a scientific staff of some 150 professionals of 31 nationalities. More than 19,000 students from over 150 countries have graduated from courses at the institute since 1952. ITC offers courses at different levels: PhD degree (conducted in collaboration with Netherlands universities), Master of Science degree, Master degree, postgraduate and undergraduate Diploma and Certificate courses.

The ITC degree programmes are nationally accredited and registered in the Central Register of Higher Education (CROHO) of The Netherlands.

Recently ITC embarked on a programme of decentralizing its education, through joint education programmes with partners in various countries throughout the world. ITC also offers a growing number of distance education courses.

Updating the knowledge and skills of ITC alumni is an important task, in addition to the institute's regular courses. Therefore, ITC organises refresher courses at ITC and abroad.

The language of instruction is English.

Research

ITC carries out multidisciplinary and problem-oriented research that focuses on strengthening organisations involved in survey, management and planning for sustainable development. To this end, a strategic multidisciplinary research programme with the following themes is established:

- Biodiversity in fragmenting landscape
- Carbon-cycle and climate change
- Stochastic methods for image mining and data quality
- Disaster management
- Earth systems science
- Food security and environmental sustainability
- Governance and Integrated Spatial Assessment
- Spatial data infrastructure technology
- Spatio-temporal data integration and visualization
- Informed multilevel governance of urban regions
- Land administration for informed governance
- Managing water scarcity
- Sustainable urban-regional dynamics
- Utilisation of sensor developments for efficient topographic mapping
- Water cycle climate

Advisory services

ITC's transfer of knowledge also encompasses advisory services, mainly in developing countries. Advisory services of ITC often act as a follow-up service to alumni and their organisations and institutes.

Approximately 1000 projects have now been completed and ITC is presently committed to a wide variety of assignments around the world. The majority of these are based in developing countries and are education-oriented.

Introduction to ITC's educational programmes

At degree level ITC offers PhD, MSc and Master degree courses. Also Diploma courses, and short courses (some through distance education) are offered as part of the regular education.

The MSc degree programme in Geo-Information Science and Earth Observation (lasting 18 months) consists of seven courses, each with a specific orientation:

- **Applied Earth Sciences**
- **Geoinformatics**
- **Governance and Spatial Information Management**
- **Land Administration**
- **Natural Resources Management**
- **Urban Planning and Management**
- **Water Resources and Environmental Management**

The Master degree programme (lasting 12 months) consists of two courses:

- **Geoinformatics**
- **Natural Resources Management**

Postgraduate Diploma courses (lasting 9 months) are offered in:

- **Applied Earth Sciences**
- **Geoinformatics**
- **Land Administration**
- **Natural Resources Management**
- **Urban Planning and Management**
- **Water Resources and Environmental Management**

Programmes in cooperation with other institutes

ITC cooperates with Universities in The Netherlands, Europe and throughout the world in full-time and part-time joint education programmes, leading to MSc and Master degrees and to Diplomas:

- In The Netherlands ITC cooperates with the universities of Utrecht, Delft and Wageningen in an MSc course, focusing on Geographic Information Management and Applications (GIMA). The course is offered through distance learning, with four periods of classroom learning.
- In Europe, ITC cooperates with the universities of Southampton, Lund and Warsaw in an MSc course on Geo-information Science and Earth Observation for Environmental Modelling (GEM). The course is taught in four countries: UK, Sweden, Poland and The Netherlands.
- ITC has entered into partnership with reputable education institutes for the purpose of providing joint courses in several countries throughout the world. At present, MSc and Master courses are or will be conducted in Bolivia, China, Ghana, India, Indonesia, Iran, Kenya, Mexico, Nigeria and Tanzania.

For more information on our joint courses, please consult the ITC website (<http://www.itc.nl/education/jointcourses.aspx>).

Master of Science degree, Master degree and Postgraduate Diploma

Master of Science degree

The 18 month Master of Science degree programme is intended for participants with a future task in research and development. In addition to 12 months regular coursework, the Master of Science participants learn by doing research and/or by developing new methods or techniques in a 6 months thesis period.

Successful completion of the MSc degree programme provides graduates with a qualification that enables them to continue to PhD level, either in the Netherlands or abroad.

All Master of Science courses lead to a degree with the title:

"Master of Science in Geo-Information Science and Earth Observation".

Master degree

The 12 month Master degree programme is more profession oriented and teaches more practical skills. It could be compared to taught masters in other countries.

All Master courses lead to a degree with the title:

"Master in Geo-Information Science and Earth Observation".

Postgraduate diploma

The 9 month Postgraduate diploma programme caters for young and mid-career professionals who need to be proficient in applying geo-information science and earth observation in their field of interest, analysing problems and applying new methods and techniques, and managing (multi)disciplinary scientific teams.

The Postgraduate diploma course is equal to the taught part of the MSc course.

The Postgraduate Diploma course leads to a Diploma with the title:

"Postgraduate Diploma in Geo-Information Science and Earth Observation"

Course structure

The duration of the Master of Science courses is 18 months, of the Master courses 12 months and of the Postgraduate Diploma course 9 months.

All ITC courses are divided into 3 week periods (modules) or multiples of 3 weeks (blocks) in which one subject or related subjects are taught. All Master, Master of Science and Postgraduate Diploma courses start on the same date in September each year. The Postgraduate Degree programme is taught together with the MSc programme during the first nine months. The Master programme is taught separately.

ITC's core business is the collection and handling of geo-information and its application in various fields involved in sustainable resource development. ITC has given its core business a prominent place in the courses. Block 1 (modules 1-4) in all degree courses contains ITC's core curriculum: (at least) three weeks of these core modules are spent on Geographic Information Systems (GIS) and (at least) three weeks are spent on Remote Sensing. In addition to these core modules all programmes offer more advanced modules in geo-information and earth observation techniques that vary per course.

Master of Science and Postgraduate Diploma programme

The Master of Science programme is split up in 4 *blocks*. The PGD programme is equal to the MSc programme during Block 1 and 2. MSc and PGD students follow these blocks together in class.

Figure 1

Structure of MSc and PGD courses

Block 1 Principles of RS and GIS (4 modules)	Block 2 Scientific domain (6 modules)	Block 3 Research profile (5 modules)	Block 4 Individual MSc research (8 modules)
MSc programme →			
PGD programme →			

Figure 2

MSc and PGD course structure in detail

			MSc	PGD
Block 1	1	Introduction, Principles of RS and GIS, Application in domain		
	2			
	3			
	4			
Block 2	5	Domain modules, different per course (AES, GFM, GSIM, LA, NRM, UPM, WREM)		
	6			
	7			
	8			
	9			
	10			
Block 3	11	Research skills		Final assignment
	12	Advanced subjects		
	13			
	14	Research themes, MSc proposal		
	15			
Block 4	16	Individual MSc research	MSc thesis	
	17			
	18			
	19			
	20			
	21			
	22			
	23			

Block 1: Principles of GIS/RS

Block 1 is the common core of all ITC educational programmes. It teaches the basic principles of Remote Sensing and GIS, and how these can be applied in various domains. This common core ensures a basic level of GIS and RS for all students, regardless of their background and

experience. Block 1 also contains an introduction to the course as a whole and the teaching approach, and a student advisor is assigned to each student.

Block 2: Domain

Block 2 is specific for the different courses within ITC MSc programme (AES, GFM, GSIM, LA, NRM, UPM, WREM). In this block the basic principles of the domain and application of GIS and RS in it are taught and deepened. Please look at the course specific parts of this study guide to find out more about the content of Block 2 in your course. Students need to select an MSc thesis topic in this block and work this out in an MSc pre-proposal. An MSc day and MSc fair are organised to support this.

Block 3: Research profile

Block 3 prepares the student for his/her MSc research by offering learning opportunities on research skills, advanced research tools and methods, and deepening of research topics. It starts with a module on research skills. The module is similar for all courses. The objectives are common, but examples and cases are used from the scientific domain of each course. Two MSc supervisors are assigned to each student.

The second part contains "advanced topics". These topics go in-depth in a certain research method or tool. These have a more generic nature and are supposed to attract students from different domains. Students have to make a choice from these advanced topics, which match to their envisaged MSc thesis topic. Because of the advanced level, entry requirements may be defined for the advanced topics.

The third part of this block is assigned to the ITC research themes. Students have to formulate their MSc thesis topic within one of ITC research themes. In the last two modules students will study state-of-the-art knowledge and research in these themes in a group research assignment. Parallel to this, the student will work on his/her final MSc thesis proposal. The student has to make a choice for a certain research theme, based on his envisaged MSc thesis topic.

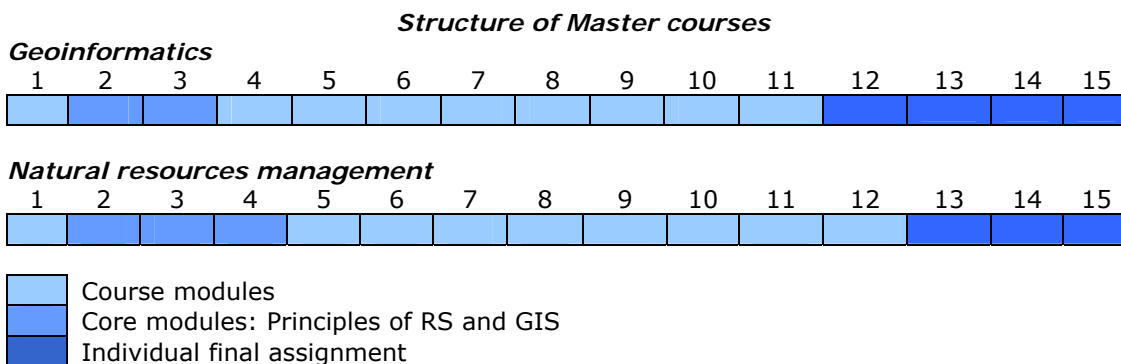
Block 4: Individual MSc research

In Block 4 the student works individually on his/her MSc thesis. It is required to have an approved MSc research proposal before entering this block. During this block there is interaction with the staff, PhD and MSc students of the research theme, for example in *capita selecta*. Each student will be assigned 2 MSc supervisors. Formal assessment will be given at the mid-term presentation and of course the final MSc exam (see MSc regulations).

Master programme

The Master programme is made up of 15 modules, consisting of core modules about GIS and Remote Sensing, course modules, and an individual final assignment.

Figure 3



Course modules

In the first module, the course domain and principles of databases are introduced. In module 5 and further the core modules are applied within this course domain.

Core modules

Modules 2 and 3 teach the basic principles of Remote Sensing and GIS, and how these can be applied in various domains. This common core ensures a basic level of GIS and RS for all students, regardless of their background and experience. The core modules are taught together in class with the MSc and PGD students.

Individual final assignment

The Master programme concludes with an individual final assignment in which the participant can work on a case and topic which is tailored to his or her particular situation and interest. Participants are encouraged to bring data and other material from their home country for this purpose, subject to approval.

Academic Profile MSc

The academic profile of the MSc programme puts strong emphasis on the scientific discipline, a scientific approach, basic intellectual skills, co-operation and communication and the temporal and social context of research. The emphasis on doing research and/or designing or developing new methods or techniques depends on the application domain.

Multi-disciplinary research is an important focus for the MSc programme because (applied) research in practice seldom concerns one discipline but is more likely to be multidisciplinary. Students have to be prepared for that. Starting with a sound basis in their own domain they will be brought into learning situations in which students from different domains work together. It should be noted that most if not all research at ITC is already multidisciplinary in nature. This is evident in the wide scope of expertise within departments, and the common denominator to carry out applied research contributing towards development related issues as specified in ITC's mission.

Teaching Approach MSc

In their profession, the graduates have to apply knowledge and skills independently. The MSc programme is therefore focused at handing over the control of the learning process to the student. At the beginning of the programme, the teacher will have the main control and the programme will contain some choices, especially concerning preparation for the MSc research. The choices should be motivated, fit to the envisaged research trajectory, and be accepted by the course director. During the programme the teacher role will develop towards the role of advisor. The student takes the lead in his/her own learning process by developing his/her own learning plan within the MSc framework and guidelines. The teacher supports this as a coach (while still passing on his/her experience).

Study load of the ITC degree programmes

The European Union has developed a European Credit Transfer System (ECTS) to allow easy comparison of study load of courses within Europe. ITC has adopted this system as a means of improving academic recognition for study abroad.

In ECTS, 60 credits represent the workload of an academic year (9-10 months) of study.

These include lectures, practical work, seminars, tutorials, fieldwork, and self study. At ITC, each module of three-week duration has a study load of 5 ECTS.

The MSc course consists of 23 modules and three additional weeks of remedial teaching, catch-up activities and graduation ceremonies, totalling 118 ECTS. The Master course consists of 15 modules and two weeks of remedial teaching, catch-up activities and graduation ceremonies, totalling 77 ECTS. The Postgraduate Diploma course consists of 12 modules and 1 week of remedial teaching, and catch-up activities, totalling 61 ECTS.

Opening hours of various ITC facilities

ITC building	
Monday-Thursday	07:30 - 22:30
Friday	07:30 - 21:00
Saturday	09:00 - 17:00

Bookshop (room 0-006)	
Monday-Friday	08:30 - 12:15 12:45 - 16:00

Library (room 3-038)	
Monday, Thursday, Friday	08:30 - 17:00
Tuesday, Wednesday	08:30 - 21:00

Audio-Visual centre (room 3-039)	
Monday, Thursday, Friday	08:30 - 17:00
Tuesday, Wednesday	08:30 - 21:00

Students' financial administration desk (room 1-130)	
Monday-Friday	10.30 - 13.30

Computer helpdesk (room 1-004)	
Monday-Friday	08:30 - 12:45 13:30 - 17:00

Restaurant (ground floor)	
Monday-Friday	
Coffee break <i>free coffee/tea</i>	10:15 - 10:45
Lunch	12:00 - 13:30
Tea break <i>free coffee/tea</i>	15:15 - 15:45

Starting dates modules and holidays

Module number	2008 / 2009 / 2010
Registration	Monday, September 15, 2008
Opening Academic year	Thursday, September 25, 2008
Module 1	September 29 through October 17
Module 2	October 20 through November 7 RS core exam: November 7
Module 3	November 10 through November 28 GIS core exam: November 28
Module 4	December 1 through December 19 RS core re-sit exam: December 10
DIES celebration	GIS core re-sit exam: December 17: morning Wednesday, December 17: afternoon no classes
X-mas	December 25 through December 26
New Year	January 1, 2009
X-mas break	December 22, 2008 through January 2, 2009
Module 5	January 5 through January 23, 2009
Module 6 MSc day	January 26 through February 13 Wednesday, January 28, 2009
Module 7	February 16 through March 6
Module 8 MSc fair	March 9 through March 27 Wednesday, March 11, 2009
Module 9	March 30 through April 17
Good Friday	April 10
Easter Monday	April 13
Module 10	April 20 through May 8
Queen's day	Thursday, April 30
Liberation day	Tuesday, May 5
Catch-up week	May 11 through May 15
Module 11	May 18 through June 5
Ascension Day + compulsory ADV	May 21 through May 22
Whitsun Monday	June 1
Closing week PGD	June 8 through June 12
Closing PGD	Friday, June 12
Module 12	June 8 through June 26
Module 13	June 29 through July 17
Module 14	July 20 through August 7
Module 15	August 10 through August 28
Closing week Master - Catch-up week MSc	August 31 through September 4
Graduation Master	Friday, September 4
Module 16	September 7 through September 25
Module 17	September 28 through October 16
Module 18	October 19 through November 6
Module 19	November 9 through November 27
Module 20	November 30 through December 18
X-Mas, New year break	December 24, 2009 through January 1, 2010
Module 21	December 21, 2009 through January 15, 2010
Module 22	January 18 through February 5
Module 23	February 8 through February 26
Closing week MSc	March 1 through March 5, 2010
Graduation MSc	Friday, March 5, 2010

Governance and Spatial Information Management

2008 / 2009 / 2010

Introduction

Short history of the cooperation of ITC with University Twente (UT)

ITC is traditionally an Institute that has specialized on the capture, processing and presentation of spatial data. Remote sensing, GIS technology are at the core. The use of the data in different sciences is reflected in the different departments of ITC and the course programs it offers. These cover the complete range from basic topography applications to earth sciences applications, natural resource management, urban management and land administration.

The University of Twente is a neighbor of ITC. In the near future ITC will become a faculty of the University. The Faculty of Management and Public Policy of the university specialises on Public Policy Analysis and Public Policy Making making with emphasis on the environment and sustainable development.

Since 2006 ITC and the University Twente cooperate in the implementation of a new course on "Governance and Spatial Information Management- GSIM".

Participants in this course follow some course elements at the University or by University staff and have an opportunity to get their support in the research phase.

The Master of Science degree for the GSIM program is issued by ITC.

Background

Many of the activities and processes with respect to governance deal with the multi-functional use of space and are spatial in nature. Though the recognition of the spatial dimensions of governance is not new, developments in spatial information technology pose new challenges and opportunities in this respect.

In general Public Policy design and Public Administration processes can be characterized as:

- Public governance: historical, comparative analysis of trends in public governance institutions and their driving forces in policy dynamics;
- Public policy and management: historical and comparative analysis of trends and their driving forces in policy dynamics; and analysis of methods and heuristics for 1) policy design, 2) policy implementation and management, and 3) policy evaluation
- Public organization and management: historical and comparative analysis of trends and their driving forces in (inter)organizational structures and dynamics; and analysis of methods and heuristics for organizational design, change and management.

Some believe that the wide-ranging development in informatics, with spatial as well as general connotations, has brought about a new paradigm to government and management. It is said that modern informatics can help revive and strengthen grass-root democracy and arm's length management. Speedy, accurate and well-tailored information embodies the potential of fast and precise action and reaction, and the involvement and participation of many stakeholders.

The above refers to the potential contribution of information and communication technology in general to good governance and government. 'Spatial Information Technology', as a specialised field in ICT, has been developed to cater for the spatial dimensions of decision-making. Many a mandate in the administration has considerable geographical dimensions. In

this connection, we may refer to, e.g.: land information systems, cadastral operations, land use planning, physical planning, centre-periphery connections, the geographical distribution of poverty, the distribution and composition of economic development, public finance, disaster management, and the organisation and management of national and sub-national elections. And there are many others. This puts proper spatial information management (SIM) squarely in the position of a key aspect of good governance and government.

The course thus centres in the interaction of policy making and collecting and combining spatial information. At the one hand policymaking triggers the collection of proper (spatial) information and at the other hand available spatial information drives decision-making processes.

Focus of the Course

Geo information has gained importance in societies in the past decades. The technological developments in data collection through satellite imagery and processing with GIS cause that more, better and timely information can be provided. The development of spatial data infrastructures makes it possible to combine different themes and create added value with web technologies.

The public sector has always been a major spatial data provider and user. Topographic mapping, Land use planning, Urban and Rural development, Environmental management, Infrastructure management, Land administration and Land Registration are examples of Public sector activities in which Geo information plays a major role.

ITC puts the scientific, technological and institutional dimension of Geo information in the centre of its teaching and research activities.

Public Policy Development and Public Management have undergone major shifts in the past decades due to Government reform and decentralisation, market reform and information technologies.

Governments have invested much in digital registration systems. Many Governments are active to develop service delivery to citizens via Internet technology. Nowadays the use of information technology for Policy evaluation and Policy design is explored.

Public policies are necessary to mitigate negative effects when social- and environmental inequalities and degradation arise.

A Public Policy has different dimensions: political, legal, economic, technical/scientific and ecological/sustainability.

The Faculty of Management and Public Administration of University Twente puts these different dimensions central in education and research.

Through the cooperation of ITC and UT the geo-information will be linked to the political, legal, economic, technical dimension of Policy Design. Special attention is given to sustainability aspects and the environment as this implies a strong spatial relation of society with the natural resources.

The integration of the topics is practiced in case studies and assignments.

In the research phase the student will be able to focus on a theme of personal and professional interest.

Course objectives

Providing students with an adequate understanding of systems of governance and the embedded role of spatial information, and the competencies necessary to act effectively in order to improve the quality of Administration and spatial policy.

The MSc GSIM has the following exit qualifications:

- Insight in governance networks and their impacts on the quality of administration and policy-making in a spatial context;
- The ability to reflect on the dimensions of quality in administration and policy;
- The ability to reflect upon policy information and its relation with spatial knowledge and spatial information;
- The ability to translate spatial knowledge in recommendations and designs;
- The ability to formulate ways to adjust processes of (spatial) data collection and information provision to improve the quality and availability of information for the Public Sector

The ability to do research (i.e. knowing how to formulate a research assignment, how to monitor the implementation of a research project, how to transform research findings in practical recommendations).

Target group

The focus of G-SIM is on the relation between Geo Information Science and Technology on the one hand and Governance on the other hand. The G-SIM program is designed for the ITC target group of mid career professionals from non-European countries.

The mid career professional has (minimal) a Bachelor Degree in a science, which made him/her eligible for a job in the public sector. Especially professionals in Policy Agencies in which ICT developments are starting or taking place are targeted.

As an estimated 80 % of public sector information has a spatial dimension or connotation, almost all Public Agencies can be considered.

Implementation and Structure of the course

The cooperation with the University Twente allows combining elements from University courses on Public Administration at the University with the topics of geo sciences and their application at ITC. The GSIM course is unique in this sense. Participants will follow some courses at UT together with other university students. Some courses will be given by -and in cooperation with- UT staff at ITC.

The educational methods and schedules of both institutes are different. This requires some flexibility from the side of the participants to adapt to these differences. The advantage, though, is that the participant will be able to get contacts and a good feeling of the academic environment at the University.

The MSc structure at ITC

The calendar of block 1 and 2

Calendar UT	Calendar ITC	Education by UT		Education by ITC			
Quartile 1	Block 1	Introduction		Introduction			
				Mod. 1: Introduction to GSIM, economics and spatial data			
				Mod. 2: Remote Sensing			
Exams		Mod. 4: Policy analysis (taught at ITC)		Mod. 5: Environmental policy			
Quartile 2						Mod. 3: GIS	
Christmas holidays				Christmas holidays			
Quartile 2	Block 2						
Exams							
Quartile 3							
Vacation							
Quartile 3		Mod. 6: Introduction to law		Mod. 8: Spatial planning and law			
Exams				Mod. 9: Regional economics			
Quartile 4				Mod. 10: Spatial methods and techniques			

Figure 1: GSIM course setup for Block 1 and 2

Block 3 and 4

From Block 3 onwards, the students will only study at ITC and follow the regular M.Sc. programme.

The MSc. Research

Students will conduct their thesis research mainly within the research theme "Informed Multilevel Governance of Urban Regions". The thesis research topic however is not limited to the urban regions; students may also be interested in non urban regions.

The prime research objective of this theme is to attain better governance (e.g., more openness, participation, legitimacy, accountability, effectiveness, equity, coherence, efficiency, better outcomes) in urban-regional contexts by means of geo-information and communication technologies.

'Governance' refers to the rules, processes (including participatory decision making processes) and behaviours of actors (governments, public sector, civil society, private sector) that affect the way power is exercised in an urban-regional context. In the research theme the focus is on understanding the rules and processes and more specifically the role of geo-information and geo-information technology therein as well as the behaviours of the parties involved in urban-regional governance. The focus is also on the transformation of governance processes (i.e. public participation in policy formulation, more efficient internal government operations, the provision of relevant services to citizens) and on the rules and interactions of the parties involved, for example brought by adequate information and communication infrastructures or by so-called Collaborative Planning and Decision Support Systems.

Geo-information plays a crucial role in the analysis of the processes of governance (e.g., detection of information networks), while geo-information technology is crucial for their transformation (e.g., by cultivating and scaling up geo-information infrastructures, developing and applying Planning/Decision Support Systems). Innovative data and knowledge acquisition methodologies (including participatory methods) and proper visualization of geo-information (e.g., like interactive web-based mapping for collaborative participatory assessment and applications) are crucial for transformation of governance processes.

Thesis topics

Students have to find a thesis topic in which the public domain is approached from a spatial dimension. Students can choose between different sectors within the public domain for their research such as health, transport, environment, or economy. A problem or phenomena from this sector is then researched from the perspective of different spatial units: How do certain regions differ with respect to this public domain topic or issue? The research questions can address the influence of governance on processes in the public domain and/ or the influence of processes in the public domain on governance. The topic of public versus private will often return in these discussions.

Supervision

To provide for the supervision of students from both the governance and public sector side, MSc supervision will be done by 2 supervisors. One supervisor will be from governance, and the other with knowledge of the public sector addressed in the thesis.

Module descriptions of the GSIM curriculum

Introduction to GSIM		
Module: 1	Co-ordinating staff: Drs. J.C. de Meijere	
Start:	29-09-2008	
End:	17-10-2008	
Level: MSc		M08-GSIM-101

Introduction

This module introduces the objectives of the GSIM program as the combination of problems and sciences of Public Administration and Economics next to the geo information sciences (GIS, Remote sensing, geo-information management). A conceptual framework for Governance and Geo information sciences is developed with the participants. An assessment will take place of the deficiencies of each of the participants as well as an assessment of the competences. Basic economics concepts are refreshed and elaborated in relation to space. The principles of Object Modelling will be taught and practiced. The concepts and techniques introduced in the module will be further used and developed during subsequent modules.

Contents

The module covers the following topics:

- The core of Public administration
- The core of Economics, Macro and micro economic theory
- The core of Space and Land , modelling and mapping
- State, Private sector and Civil society
- Modelling societal and natural phenomena on Land with object oriented concepts.

Objectives

Main objective: To create a mental framework for Governance and SIM.

At the end of the module the course participants should be able to:

- Explain the principles and use the vocabulary of Governance;
- Describe the societal processes subject to Governance
- Describe physical processes and their consequences for governance
- Explain the main economic processes in society
- Explain the difference between public and private domains
- Evaluate the degree of theoretical knowledge and skills in the different elements of the course curriculum.

At the end of the module the student should be able to:

- Explain Public and Private domains
- Explain economic processes in theoretical concepts
- Explain the concepts of Information and Data and apply data modelling to the public and private domains.

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

PC; RDBMS and Visio

Teaching Materials

- N. Gregory Mankiw, Principles of Microeconomics, Thomson 2004
- Sally Slaer Object Oriented Systems Analysis. Modelling the world in Data, Yourdon Press.
- Introduction to Public administration (reader)
- Reader with scientific articles

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
34	36	0	4	8	0	28

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Assignments and written exam

Note(s)

Earth Observation for Urban Planning and Management and Governance and Spatial Information Management		
Module: 2	Co-ordinating staff:	
Start: 20-10-2008	Ing. F.H.M. van den Bosch, Ir. G.R. Hennemann	
End: 07-11-2008		
Level: MSc, PG		M08-UPM-103

Introduction

The module introduces the principal concepts and techniques of Remote Sensing (RS) and operational skills necessary to acquire the most appropriate remote sensing data and extract geo-information from such data. The objective is to create a firm basis for the successful integration of remote sensing to applications in urban planning and management. The module provides a foundation and a conceptual frame to assess the scope (and limitations) of RS in urban planning and management.

The module consists of three interrelated parts: a theoretical part focusing on the concepts, a practical part aiming at developing hands-on skills in using software tools, and an application oriented part in which participants learn how to relate the theoretical knowledge and practical skills to solving typical application problems in urban planning and management.

Contents

Principles of RS

- The electromagnetic spectrum
- Sensors and platforms
- Geometric and radiometric aspects of remotely sensed data
- Image enhancement and visualisation
- Image classification and interpretation
- Quality assessment
- Examples of urban application of RS

Objectives

- At the end of the module the participants must be able to explain the principles and use the vocabulary of RS
- The participants should be able to carry out basic RS operations.
- The participant should be able to apply the concepts in urban planning and management related fields, to support urban processes and problem solving.

Prerequisites

- Computer skills
- Stereo and color vision

Recommended Knowledge

A professional background in Urban Planning and Management (or related field) is recommended.

Hardware and Software Requirements

Personal Computer, ILWIS and Erdas software

Teaching Materials

- Principles of Remote Sensing, ITC Educational Textbook series 4, 2008
- Exercises RS, 2008
- Handouts and lecture notes 2008
- Digital teaching materials

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
34	40	0	4	2	32	8

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

The assessment will consist of a written closed book exam on ITC textbook 'Principles of RS' (theory)

Note(s)

Module given at ITC together with UPM course

Geo-information Science and Urban Planning and Management		
Module: 3	Co-ordinating staff:	
Start: 10-11-2008	Dr. J.A. Martinez, Ing. F.H.M. van den Bosch	
End: 28-11-2008		
Level: MSc, PG		M08-UPM-104

Introduction

The module introduces the principal concepts and techniques of Geographic Information Systems (GIS). To understand the methods and techniques of managing urban datasets within the GIS system emphasis is given also to Database Management Systems (DBMS). The concepts will be explained with examples drawn from specific urban applications. The module provides a foundation and a conceptual frame to assess the scope (and limitations) of GIS in urban planning and management.

The module consists of three interrelated parts: a theoretical part focusing on the concepts, a practical part aiming at developing hands-on skills in using software tools, and an application oriented part in which participants learn how to relate the theoretical knowledge and practical skills to solving typical application problems in urban planning and management.

Contents

The module cover the following topics:

Principles of GIS

- Geographic information and spatial data types
- Organization of data
- Determining- and mapping position
- Spatial data entry and preparation
- Spatial data analysis and data visualisation

Objectives

- At the end of the module the participants must be able to explain the principles and use the vocabulary of GIS
- The participants should be able to carry out operations.
- The participant should be able to apply the concepts in urban planning and management related fields, to support urban processes and problem solving.

Prerequisites

- Computer skills

Recommended Knowledge

A professional background in Urban Planning and Management (or related field) is recommended.

Hardware and Software Requirements

Personal Computer and ArcGIS

Teaching Materials

- Principles of Geographical Information Systems, ITC Educational Textbook Series 4, 2008
- Exercises Principles of GIS, 2008
- Handouts and lecture notes 2008
- Digital teaching materials

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
36	40	0	0	4	32	8

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

The assessment will consist of a written closed book exam on ITC textbook 'Principles of GIS' (theory)

Note(s)

Module given at ITC together with UPM course

Introduction to Policy Analysis and Policy Evaluation		
Module: 4	Co-ordinating staff:	
Start: 01-12-2008	Dr. F. Coenen	
End: 19-12-2008		
Level: MSc		U08-GSIM-113

Introduction

Policy problems can be notoriously difficult to tackle, because policy makers did not have full understanding of the problem, or because the definition of the problem involved political struggle. Moreover, alleged solutions appear to bring new problems because different policies interfere with one another, or are even contradictory. This course helps to understand how problems reach the agenda of policy makers, how policies are designed and can be analyzed, how decision making on these policies takes place, and how such decisions are implemented and evaluated. All this takes place in a broader social and political environment; policy making is not an isolated affair. The relevant concepts and theories for analyzing the policy process and for policy design are presented. Each step is illustrated with empirical cases.

Contents

- How to explain policy making in the real world
- The analytical components of policy programs
- How do policies affect citizens?
- How to analyze and evaluate policies

Objectives

At the end of the module student should be able to:

- distinguish the elements of the policy process and understand the concepts and approaches for analyzing these elements;
- apply the concepts and approaches to real world problems reported in newspaper articles and other sources;
- use methods for analyzing policy

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

Public policy analysis: an introduction

W.N. Dunn

Pearson Education 2004

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	20	80	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Written exam, assignment

Environmental Policy		
Module: 5	Co-ordinating staff:	
Start: 05-01-2009	Prof.Dr. J.T.A. Bressers	
End: 23-01-2009		
Level: MSc		U09-GSIM-101

Introduction

The module is for all students that are interested in the possibility of realizing a truly sustainable society.

Contents

The challenge of sustainable development has evoked in the Netherlands and many other countries a wave of policy innovation, resulting in an exciting laboratory for new modes of coordination. Among the subjects: sustainability and environmental quality as policy problems, various forms of steering strategies in environmental policy, water management, the practical relationship between governments and companies, the role of consumers, the international context and the future of 'the ecological state'. Relevant theories and the practical functioning of these policies are addressed. During the lectures specific attention will be paid to cross-national comparison in a Western European context.

Objectives

At the end of the module student should be able to:

- understand what specific challenges the sustainability problematic poses for public policy;
- assess the pros and cons of different environmental policy strategies;
- analyze the feasibility and the ability for implementation of such strategies.

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

Reader 'Environmental Policy'

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	0	100	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Oral examination (or written examination when there are more than 10 students).

Note(s)

Module given at UT (CSTM)

Introduction to Law		
Module: 6	Co-ordinating staff:	
Start: 26-01-2009	Dr. H. Heldeweg	
End: 13-02-2009		
Level: MSc		U09-GSIM-102

Introduction

In the European Union various legal systems exist. Some of these systems have much in common, others vary significantly. The last two decades the law of the Member States has been increasingly developed in interaction with EU law. Vice versa, EU law is strongly influenced by legal solutions of the Member States. In this course major fields of law are introduced.

Contents

First some general subjects are dealt with, such as the question 'what is law', as well as strands of thought in European legal history and theory, characteristics of legal science and legal methods. A second subject is the classification of legal families, legal traditions and jurisdictions of the Member States of the EU. In a third step basic concepts of the fields of constitutional law, administrative law and private law are addressed from a comparative perspective. Particular examples and cases are discussed. Attention will be paid to the legal context of the EU.

Objectives

At the end of the module student should be able to:

- Explain origins and types of law
- Formulate characteristics and requirements for legislation
- Understand differences between legal systems and traditions
- Explain the role of legislation in public and private activities
- Explain the role and functions of Law in Governance

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

About Law

Tony Honore, Clarendon Law series

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	0	100	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Written exam

Note(s)

Module given at UT (European Studies)

Principles of Land Administration		
Module: 7	Co-ordinating staff:	
Start: 16-02-2009	Dr. A.M. Tuladhar	
End: 06-03-2009		
Level: MSc, PG		M09-LA-103

Introduction

The main aim is to learn how land administration and its different components shape the land administration process, both from an institutional as operational points of view. In order to enhance the knowledge about practical issues, the students will make study tours to land agencies in the Netherlands.

Contents

- Land tenure and land rights as institution ('North'); as human rights;
- Land tenure security and certainty. Various forms of man-land relationships, various of security
- Legal pluralism; customary principles, the continuum of land rights, title vs. right debate;
- Legislative framework for land administration processes; various law families and meaning
- Land registration: principles, difference forms of registration and procedures for initial registration and maintenance of land records, quality management;
- Cadastral systems: concepts of fiscal, legal and multipurpose cadastral systems, cadastral domain model, parcel numbering system, standards, procedure for initial, subdivision and other maintenance phases, legal vs. spatial surface areas, quality improvement management
- Criteria to evaluate land tenure, security, land laws, land administration systems, costs/benefits

Objectives

At the end of the module the student should be able to:

- Discuss paradigms of land administration
- Explain concept of tenure, value and use of land,
- Explain systems of registration and cadastre
- Be aware of the existence of land-, marine-, forest cadastres (etc.)
- Explain the role and impact of legal frame works regarding land (land law, privatization\ law, land reform law, land redistribution law, expropriation law etc)
- Explain public and private roles in land administration
- Discuss the function of land administration for land policy implementation
- Design land administration processes and reflect on various performance indicators

Prerequisites

Successful completion of modules 4, 5 and 6

Recommended Knowledge

Knowledge of land administration processes in participants' home country is recommended

Hardware and Software Requirements

PC, MS office software

Teaching Materials

Books:

- Land Administration by P. Dale and J. McLaughlin
- Land Administration Guidelines (with reference to countries in transition) by UN ECE, Geneva

Literature:

- Lecture note on Land Administration by P. van der Molen
- Syllabus of 10-20 papers

Learning materials Assignments:

- A set of assignments as group and individual tasks to be completed by the students

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
30	12	0	12	32	50	8

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Reports and presentation on Group assignments (50%)

Written examination (50%)

Note(s)

Module given at ITC together with LA Course

Spatial Planning, Environmental Governance and Law		
Module: 8	Co-ordinating staff:	
Start: 09-03-2009	Dr. H. Heldeweg, Dr. F. Coenen	
End: 27-03-2009		
Level: MSc		U09-GSIM-103

Introduction

The module aims at understanding the main characteristics of and relationships between Environmental Law, Spatial Planning and Nature Conservation, comparative and critical understanding of main legal governance structures in these areas of law, with a focus on integrated policies.

Contents

Historically Environmental law, Physical planning law and Nature Conservation Law are treated as separate legal areas. Today, however, the strive for (physical) sustainability has given rise to approaches that seek to integrate these area's into comprehensive legal policies. In these policies also more attention must be giving to economic issues and more use must be made of economic instruments. The course firstly focuses on the possibilities or barriers for such legal/economic integration. Secondly an analyses is made of the diversity of (main) legal governance structures applied as legal policies in the three area's but especially where an attempt is made to integrate these policies (as for instance with Ecosystem management or tradable property development rights). The core locus of the course lies with European Environmental Law, but when relevant or inspiring examples will be drawn from International Environmental Law and environmental Law on the state level (also from outside the EU, such as the USA).

The main topics of Spatial Planning and (legal) governance structures, instruments and main procedural provisions proposed in this field will be compared and contrasted with the ones found in Environmental law and Law & economics, with special attention to the effect on Sustainability issues.

Objectives

At the end of the module student should be able to:

- Understand the historical context of spatial planning
- Explain the concept of sustainable development in relation to land and resource-use
- Formulate governance requirements for environmental policies
- Understand spatial planning as a multi level and multi stakeholder process.

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

Planning, law and economics. B. Needham Routledge 2006

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	0	100	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

written exam / assignment

Note(s)

Module given at UT (CSTM)

Regional Economics		
Module: 9	Co-ordinating staff: Prof. A. van der Veen	
Start: 30-03-2009		
End: 17-04-2009		
Level: MSc		U09-GSIM-104

Introduction

The course gives attention to the problem how individuals behave in space and how firms locate in space. On a more aggregate level the problem is why regions differ in economic growth and how economic policy might change unequal situations.

Contents

Space is a complication in neoclassical economic theory. The course will discuss how time and space can be handled in economic theory, what theories are available to explain individual and household location choices, and why firms choose certain places. Moreover, on an aggregate level economic models will be discussed that explain differences in growth and employment levels. Finally, economic policy instruments, which are designed to change individual and firm behaviour, will be presented. Special attention will be paid to the specific relation between regions, nation states and institutions like the European Union.

Objectives

- being able to discuss theories that explain regional economic growth
- being able to recognize multiplier concepts in different theories of economic growth
- being able to discuss theories of location behaviour of firms and to relate to the concept of external economies of scale
- being able to discuss migration theories and to relate to micro theories of household location choice
- being able to discuss the relation between new infrastructure and regional economic growth

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

Textbook to be defined

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	0	100	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Assignment, written exam

Note(s)

Module given at ITC

Spatial Methods and Techniques		
Module: 10	Co-ordinating staff:	
Start: 20-04-2009	Prof.Dr.Ir. A. Stein	
End: 08-05-2009		
Level: MSc		U09-GSIM-105

Introduction

Now that more and more data are becoming available tools and technique to process these data into relevant information is essential. A characteristic of policy information is that it is in many cases a generalization of underlying data and objects. This is similar to the spatial zoom in- zoom out characteristic. Science and technology today require sound quantitative reasoning to answer research questions. Opinions must be supported by statistical inference, which uses sample data to make probabilistic statements about populations (Spatial) statistics offer tools to handle this type of problems. The aim of this module is to teach critical statistical thinking which links a research problem to the correct statistical techniques needed to answer the question. In addition, students have the opportunity to learn a sophisticated statistical computing environment which they can use in their research and throughout their careers. The R Project for Statistical Computing is the leading open-source environment for exploratory, introductory and advanced computational statistics. It offers limitless possibilities for the researcher. Of further interest are techniques to analyze behaviour trough time and space. Here techniques of agent based modelling and cellular automata are explored.

Contents

- Formulating research questions that can be answered (in part) by inferential statistics, selecting an analysis strategy (appropriate methodology)
- Basic concepts of statistics: populations, samples, parametric and non-parametric, distributions, normality
- Examining a data set: types of variables, descriptive statistics (non-inferential)
- Exploratory data analysis, including graphical methods
- Statistical modelling, the linear model, regression analysis
- Principles of multivariate statistical analysis
- Software for statistical analysis: the R project for Statistical Computing
- Basic concepts of geo-statistics: what is different about spatially-explicit data and its analysis

Objectives

At the end of the module student should be able to:

- Formulate a research question and select appropriate statistical techniques to answer it.
- Select and apply appropriate visualization and numerical techniques to explore the structure of a data set.
- Select and apply appropriate inferential techniques to address the research question with a data set.
- Identify and correctly apply appropriate techniques self-learned form textbooks and research articles.
- Use the R Project open-source statistical software correctly for visualization, exploration and analysis.
- Understand the characteristics of cellular automata, agent based modelling and spatial statistics.

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

R- Software, Arc Gis

Teaching Materials

Handouts

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	20	40	0	0	60	4

Time (in # of hours) allocated per major method:

L lecture,
SP supervised practical,
UP unsupervised practical,
GA group assignment (e.g. workshop, project),
IA individual assignment (including Thesis, IFA),
S self study,
O overhead (e.g. QH, exam, opening)

Assessment

Assignment, written exam

Note(s)

Module given at ITC

MSc Research Skills		
Module: 11	Co-ordinating staff:	
Start: 18-05-2009	Dr. D.G. Rossiter	
End: 05-06-2009		
Level: MSc		P09-EDU-100

Introduction

The ITC MSc thesis research phase aims to strengthen your ability to execute scientific research. The success of your thesis research depends, apart from skills and conceptual background in your scientific discipline, also on the ability to adequately structure your thesis. This module provides a set of generic research skills applicable to all MSc students at ITC to improve performance in the subsequent thesis research. The module teaches you why research is structured as it is and challenges you to develop the ability to critically review scientific work of yourself and others. You will be trained to analyze the structure, logic and quality of research with examples from your own scientific field. Also you will develop skills to structure scientific research. The module finally aims to create common understanding of what is expected of a thesis and how it will be assessed, to allow you to comply with these expectations.

Contents

- Logic and structure of scientific research
- Inference in various scientific disciplines
- Literature search, citation and bibliography
- Abstracting and reviewing scientific research
- Scientific writing and argumentation
- Research quality and thesis assessment
- How to structure an MSc thesis
- Ethics and professionalism in research

Objectives

Upon completion of the module, participants will be able to:

- understand why scientific research is structured as it is,
- recognize and critically assess research quality,
- present scientific research at a standard acceptable to the scientific community,
- find, evaluate, and summarize the most relevant and up-to-date scientific literature to support research, and
- structure an MSc thesis research according to academic expectations.

Prerequisites

Before entering module 11 participants have to submit their intended line of research (MSc pre-proposal), based on the available MSc projects presented at the MSc fair (March 11). This includes: choice of topic and rationale, choice of module 12, 13 and 14-15, available datasets, (optional) fieldwork planning and envisaged MSc supervisors.

At the start of module 11 participants must be able to:

- Present and discuss research in public;
- Communicate about technical subjects in written English
- Understand the importance of innovation, quality and independent thinking in science;

Besides participants are expected to have:

- A background in at least one relevant scientific field
- A critical/creative attitude

Staff involved

Dr. P.M. van Dijk, Director Graduate Programme
Dr. D.G. Rossiter, overall coordinator module 11

Delegate coordinators per course:

Dr. N. Kerle (AES)
Dr. J.E. Stoter (GFM)
Drs. J.C. de Meijere (GSIM)
Ir. W.T. de Vries (LA)
Dr. J. de Leeuw (NRM)
Dr. R.V. Sliuzas (UPM)
Dr. A.S.M. Gieske (WREM)

other departmental staff and supporting staff (Library, RC, IT)

Hardware and Software Requirements

Networked PCs, Word, End note and access to scientific bibliographic databases

Teaching Materials

Digital presentations, description of assignments, reader, scientific articles and MSc theses for review

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
31	4	0	0	0	98	11

Time (in # of hours) allocated per major method:

L lecture,
SP supervised practical,
UP unsupervised practical,
GA group assignment (e.g. workshop, project),
IA individual assignment (including Thesis, IFA),
S self study,
O overhead (e.g. QH, exam, opening)

Assessment

- (1) Full participation in (group)discussions is expected;
- (2) Further, the mark is derived from four written assignments:
 1. Literature skills: (i) Finding relevant literature from specified information resources, (ii) entering references to these in a bibliographic database, (iii) organizing the main points into a coherent paragraph, and (iv) formatting a reference list from the bibliographic database;
 2. Summarizing and abstracting an important scientific paper in the research field of your course;
 3. Assessing a published thesis from your course according to ITC criteria;
 4. Arguing a scientific position in correct, compact and direct structured technical English.

Note(s)

Module given at ITC

Ecological Economics		
Module: 12	Co-ordinating staff:	
Start: 08-06-2009	Prof.Dr. A. van der Veen	
End: 26-06-2009		
Level: MSc		U09-GSIM-106

Introduction

The module presents an overview of the literature on the relation between economic development and environmental deterioration/protection. Moreover, it discusses the issue of natural resources within economics.

Contents

Traditionally within Environmental Economics the environment has been built in on basis of a neoclassical economic paradigm. The course highlights how "the environment" is embedded within economics. Moreover, it aims at researching the effectiveness and efficiency of economic instruments of environmental policy. Finally, it pays attention to the problem how to monetize changes in environmental quality within a cost-benefit analysis.

Objectives

At the end of the module student should be able to:

- incorporate environmental externalities within economic theory
- weigh command and control instruments and market based incentives
- handle tools and methods to incorporate changes in environmental quality into Cost-Benefit analysis

Prerequisites

Not applicable

Recommended Knowledge

Not applicable

Hardware and Software Requirements

Not applicable

Teaching Materials

Ecological economics

E. Edward Jones, B. Davies , S. Hussain

Blackwell 2000

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
16	0	0	0	0	100	9

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Written exam.

Note(s)

Module given at ITC

Scenario Analysis and Collaborative Decision Support		
Module: 13	Co-ordinating staff:	
Start: 29-06-2009	Dr. M.A. Sharifi	
End: 17-07-2009		
Level: MSc		M09-PGM-106

Introduction

Increasingly generation of relevant information in multi-actor, multi-disciplinary decision environments is the problem. For improved decision-making, the required information, tools, techniques, models and procedures have to become integrated in a user-friendly information processing system called "Spatial Decision Support Systems" (SDSS). These systems are linked to the new research and development in information technology, decision science and disciplinary fields, which allow modeling and integration of complex natural and socio-economic processes. In contrast to other geo-information systems, SDSS provide insight into judgments of tradeoffs between various decision options that vary between actors. More importantly they assist to aggregate data and make them relevant information in the decision making processes.

Evaluation and visualization techniques are an essential parts of these systems, as evaluation of alternative options and choice of a specific course of action is the final phase in the decision making process. This includes identification of proper indicators covering different aspects, assessment of impacts and their related utilities, multiple criteria evaluation and visualization of the results. The effect/impacts assessments of the different alternative options, considering existing uncertainties, can be carried out by expert judgment, conducting research, or application of planning or disciplinary simulation models, which allow estimation of the relevant impacts of various options under different social, environmental and socio-economical setting (scenarios). Spatial multiple criteria evaluation and visualization techniques is applied to support arriving at final decision in single and group decision making environment to select the most appealing option, alternative "decision".

Contents

- Introduction to decision making process and decision support systems
- Assessment of some existing DSS (integrated-model, rule based model)
- Introduction of a frame work for planning and decision making
- Principles and components of multiple-criteria decision making
- Main multiple-criteria evaluation methods/techniques
- Performance assessments, indicator selection, assessment and valuation
- Theory and practice of spatial multiple criteria evaluation in spatial data analysis and decision making
- Application of spatial multiple-criteria evaluation "SMCE" in planning and decision making
- Decision making under certainty and uncertainty
- Group decision making and the required information technology supports
- Collaborative SDSS and conflict management
- Application of SMCE in group decision making
- Application of the above techniques in case studies (participants can select the case according to their background and interests)

Objectives

Upon completion of this module the student will be able to:

- Explain the principles of decision making process and decision support systems
- Distinguish between various phases of decision making process and their required types of information and support systems
- Discuss the linkages between GIS, disciplinary models and decision support systems

- Apply spatial multiple criteria decision analysis techniques to combine various layers of information 'criteria' with different quality, format and types to support planning and decision making process
- Classify and compare different multiple-criteria evaluation techniques
- Use multiple-criteria evaluation techniques in time and space to propose and appropriate solution to a spatial problem, in a single and group decision making environment
- Perform uncertainty analysis and scenario analysis
- Assess and interpret the results of the multi-criteria evaluation process

Prerequisites

MSc modules 1-11

Recommended Knowledge

Knowledge of GIS and, disciplinary knowledge of problem domain, spatial data analysis (tools and techniques).

Problem structuring, cognitive mapping, decision analysis, spatial data analysis tools and techniques, simulation and modeling, evaluation techniques, network analysis.

Hardware and Software Requirements

Computer cluster with installed Definite, ILWIS, ArcGIS, What if, community-vis, WEAP, MULINO, Geo-choice and other software.

Teaching Materials

- A reader of about 15 key research papers
- A literature research assignment
- Case study material and exercises
- A blackboard/web site with IGGM related articles and references

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
18	0	18	32	32	36	8

Time (in # of hours) allocated per major method:

- L lecture,
- SP supervised practical,
- UP unsupervised practical,
- GA group assignment (e.g. workshop, project),
- IA individual assignment (including Thesis, IFA),
- S self study,
- O overhead (e.g. QH, exam, opening)

Assessment

Based on case study reports, which will be marked.

Note(s)

Module given at ITC

Research Themes/MSc Qualifier		
Module: 14 & 15		Overall Co-ordinating staff: <ul style="list-style-type: none"> • Dr. P.M. (Paul) van Dijk • Research project coordinators appointed per research theme • 2 MSc supervisors appointed beforehand for each participant
Start:	08-06-2009	
End:	17-07-2009	
Level: MSc		P09-EDU-103

Introduction

Modules 14 and 15 form the last part of Block 3 of the MSc programme. While Modules 11 to 13 have instrumented the students with research methods and tools, the last two modules focus on the research themes of ITC. These themes form the subject framework and organizational structure in which MSc students conduct their individual MSc research in Block 4 of the MSc programme (modules 16-23). At the end of Module 15, a Thesis Admission Committee decides whether a student is admitted to Block 4.

Each ITC research theme offers one or more projects for Module 14 and 15, where possible together with one or more other themes. The general structure is the same; the content will be theme specific, and where possible inter-disciplinary. Research themes are free to fill this in within the boundaries described in this module description.

The purpose of Modules 14 and 15 is to deepen the knowledge and skills of students within the research theme and to help students to define their own MSc research proposal.

The student has to make a choice for a certain research theme, based on his/her envisaged MSc thesis topic. The following 15 themes are available:

Education Unit 14/15:	Title Research theme	Research theme leader
U09-NRS-101	Biodiversity in fragmenting landscape	Prof. A.K. Skidmore
U09-NRS-102	Carbon-cycle and climate change	Prof. A. de Gier
U09-ESA-100	Disaster management	Prof. V.G. Jetten
U09-ESA-101	Earth systems science	Prof. F.D. van der Meer
U09-NRS-103	Food security and environmental sustainability	Prof. E.M.A. Smaling
U09-PGM-100	Governance and Integrated Spatial Assessment	Prof. A. van der Veen
U09-PGM-101	Informed multilevel governance of urban regions	Prof. Y. Georgiadou
U09-PGM-102	Land administration for informed governance	Prof. J. Zevenbergen, Prof. P. van der Molen
U09-WRS-100	Managing water scarcity	Dr. M. Lubczynski
U09-GIP-100	Spatial data infrastructure technology	Dr. R.A. de By
U09-GIP-101	Spatio-temporal data integration and visualization	Prof. M.J. Kraak
U09-PGM-103	Sustainable urban-regional dynamics	Prof. F.A.M. van Maarseveen
U09-EOS-100	Stochastic methods for image mining and data quality	Prof. A. Stein
U09-EOS-101	Utilisation of sensor developments for efficient topographic mapping	Prof. M.G. Vosselman
U09-WRS-101	Water cycle climate	Prof. Z. Su, Prof. W. Verhoef

For more information about the content and scope of the ITC research themes, please visit:

<http://www.itc.nl/research/themes.asp>

Contents

Two main activities run parallel in Module 14 and 15:

1. Finalizing the research proposal for the individual MSc thesis.
2. A group research project.

1. Finalizing the research proposal

The MSc research proposal is finalized by the student in mutual agreement with his/her MSc supervisors, appointed in Module 11. The research proposal should be a logical and ordered exposition of the envisaged research (as introduced in Module 11), including data availability, (fieldwork) methodology, a flowchart, and time allocation. All data should be available at the time of the proposal presentation. The research proposal should be presented before a Thesis Admission Committee (see MSc assessment regulations paragraph 5.1.1). Acceptance of the proposal is a prerequisite for the start of module 16. The MSc student will draft a supervision plan with the two appointed MSc supervisors.

2. Group research project

The purpose of the group project is:

- To let students place their own MSc research project and research interests in a wider scientific context.
- To give students a possibility to practice conducting a research project before their individual MSc research project.
- To give students an opportunity to practice doing research in a team.
- To give students the opportunity to share their knowledge in a multi-disciplinary context.

These are considered important as a preparation for conducting the individual MSc research in Block 4, as well as the professional academic working practice afterwards in which projects are often conducted in multi-disciplinary groups.

Research projects can be defined by one or several research themes. In any case, the projects are defined with a wide angle in order to cater for a variety of research approaches and interests, as well as the relevance for society. Projects are described with a title, a problem definition, and available dataset. The student group, consisting of a maximum of 5 students, is responsible for working this out into various activities according to an agreed plan. The student group has the freedom to make their own choices, supported by a tutor. The available projects will be made known early in 2009 in order to give the participants the opportunity to select a project that matches with their research interest. The choice has to be submitted before the start of module 11 (exact date to be specified) and should be justified within the MSc pre-proposal.

In a plenary session at the start of module 14, the Principal Investigator of the research group will introduce the various MSc subjects and their interrelation in the framework of the research of his/her group, and introduce the research assignments. A tutor will be appointed during module 14-15 to guide the students groups. The tutors will convene plenary sessions (in principle per research group) to monitor the progress of all participating students and exchange experiences in a discussion forum.

Objectives

Upon completion of these modules students will be able to:

1. Write an MSc research proposal.
2. Define ways how to tackle a scientific problem and structure research.
3. Place research projects in a wider scientific and societal context.
4. Structure scientific research to specifications of the scientific discipline.

5. Meet quality standards and excellence in research.
6. Present scientific information in written English at a standard acceptable to the scientific community.

Prerequisites

Completion of Module 1 to 13 of the MSc curriculum.

Because the research themes will be taught at advanced level, it is necessary to have a basic level of knowledge in the chosen research theme. Students who want to choose a research theme which differs from their choice in Block 1 and 2, have to provide evidence that they have the right background.

Recommended Knowledge

To be specified per research theme.

Staff involved

Overall coordination: Dr. P.M. van Dijk, Director Graduate programme

- Research project coordinators appointed per research theme
- 2 MSc supervisors appointed beforehand for each participant

Hardware and Software Requirements

Identified per research theme

Teaching Materials

For each research theme a collection of resources will be available in the digital learning environment Blackboard, the library or in hard copy.

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
10	0	0	70	(120)	16 (+32)	(40)

Time (in # of hours) allocated per major method:

L lectures, (max. 10 = 5 hr/week during 2 weeks of project)

SP supervised practical,

UP unsupervised practical,

GA group assignment (= Group Research Project, incl. supervision),

IA individual assignment (= MSc proposal writing, incl. supervision),

S self study (8hr/week = 48 hr outside normal class/office hours),

O overhead (last week reserved for MSc proposal presentations).

Important:

The numbers are calculated for **two** modules: 96 hr (= 2 weeks) are allocated for the group research project, and 192 hrs (= 4 weeks) are reserved for the MSc proposal (=numbers between brackets).

Assessment

1. Group report of the research project
2. Individual written reflection report on the group research project
3. Individual MSc research proposal (written and oral presentation)

Note(s)

Modules given at ITC

MSc Research and Thesis Writing		
Module: 16-23	Co-ordinating staff:	
Start: 07-09-2009	Dr. P.M. van Dijk, Director Graduate Programme	
End: 26-02-2010	Course directors of all MSc courses 2 MSc supervisors per student	
Level: MSC	AES, GFM, GSIM, LA, NRM, UPM, WREM	U09-EDU-111

Introduction

The final stage of the MSc course is dedicated to the execution of an individual research project. Each student works independently on an approved research topic (see module 15) connected to one of the 15 research themes of ITC. In the project the students develop their research skills further, interact with their fellow students, PhD's and staff members, and have to demonstrate that they have achieved the course objectives for the Master of Science degree by research, on academic level.

Contents

Based on the pre-proposal handed in before module 11, and the final accepted research proposal prepared in module 15, the student will carry out the planned activities. The students will be provided with guidelines for the thesis early in the course (specifically in module 11). Regular individual progress meetings with the supervisors will be held to monitor the progress on the research and thesis writing, and records of the progress will be kept. The supervisors keep the course director informed about the progress.

The activities normally include:

- Describe and define a problem statement and research topic and its research margins.
- In-depth literature review, including assessment of the usability of literature and previous research.
- Collection of relevant on-line and archived data.
- Preparation and execution of a (data collection) fieldwork (optional).
- Data processing and analysis and, if deemed necessary, adjustment of the research plan in consultation with the supervisors (based on sound arguments).
- Active participation in Institute seminars and *capita selecta* of the research theme under which the MSc research resorts.
- Mid-term presentation (first week of November).
- Preparation of the final manuscript of the MSc thesis (=hardcopy thesis and CD-rom with thesis, appendices and full dataset including original data and results).
- A critical review of quality, use and usefulness of the data and results, as well as the learning process.
- Oral presentation and defence of the MSc thesis before the Thesis Assessment Board, all in accordance with the relevant paragraphs of the MSc regulations.

Objectives

The student must be able to:

- Define, plan and execute a research project dealing with a problem related to the application of geo-information and earth observation in a domain that suits his/her background and course followed.
- Write a concise, logical and well structured thesis describing the key elements of the research process, the findings and recommendations.
- Orally present and defend the work done before the Thesis Assessment Board.

Prerequisites

Successful completion of MSc modules 1-15, and the ability to do research independently (ref. to par. 5.3.1. of the MSc regulations).

Recommended Knowledge

During the research phase, the students can specialise further in their own field of expertise.

Hardware and Software Requirements

Any hardware and software with authorisation of the MSc supervisors.

Allocated Time per Teaching Learning Method

L	SP	UP	GA	IA	S	O
0	0	0	0	1136	0	16

Time (in # of hours) allocated per major method:

L	lecture,
SP	supervised practical,
UP	unsupervised practical,
GA	group assignment (e.g. workshop, project),
IA	individual assignment (including Thesis, IFA),
S	self study,
O	overhead (e.g. QH, exam, opening)

Assessment

A Thesis Assessment Board (TAB) will carry out the individual assessment based on the thesis and a presentation plus defence. The assessed aspects are:

- Research skills
- Contribution to the development of the scientific field
- Independent working
- Critical and professional thinking
- Scientific report writing
- Presentation and defence

For further details on the regulations and thesis assessment, see:

- ITC Regulations for courses leading to an ITC Master of Science (M.Sc.) Degree (September 2008)
- Instructions for Thesis Assessment Board

Note(s)

Modules given at ITC

ITC Assessment Regulations

**ITC REGULATIONS FOR COURSES LEADING TO AN
ITC MASTER OF SCIENCE (M.Sc.) DEGREE
OR
ITC POSTGRADUATE DIPLOMA**

– September 2008 –

- 1. Range of application**
- 2. Management, structure and organization of the M.Sc. and Postgraduate Diploma courses**
- 3. Admission to the course and exemptions**
- 4. Assessment of modules (excluding research period and final assignment)**
 - 4.1 Organization of module assessment**
 - 4.2 Feedback to participants and re-sits**
- 5. Research orientation and research period (M.Sc. course)**
 - 5.1 Research work and thesis**
 - 5.2 Admission to the research period**
 - 5.3 Supervision of the research work**
 - 5.4 Submission of the thesis**
 - 5.5 Thesis examination**
 - 5.6 Access to the thesis**
- 6. Final Assignment (Postgraduate Diploma course)**
 - 6.1 Final Assignment and result**
 - 6.2 Admission to the Final Assignment period**
 - 6.3 Supervision of the Final Assignment**
 - 6.4 Submission of the Final Assignment result**
 - 6.5 Assessment of the Final Assignment**
- 7. M.Sc. degree and Postgraduate Diploma assessment**
- 8. Awards and certification**
- 9. Early termination of the course**
- 10. Student appeal procedures**

Appendix:

Bodies and persons involved in management and quality of the course

These ITC Regulations for the Master of Science (M.Sc.) degree and Postgraduate Diploma courses were approved by the Rector and the Academic Board on 17 September 2008. These regulations apply to all courses commencing September 2008 onwards and replace all former ITC Regulations for Master of Science Degree Courses and Regulations for Postgraduate Diploma courses.

1. Range of application

- 1.1 These assessment regulations apply to all courses leading to an ITC Master of Science (M.Sc.) degree or a Postgraduate Diploma (PGD) starting from September 2008 onwards and replace all previous ITC Regulations for Master of Science Degree Courses and ITC Regulations for Postgraduate Diploma courses.
- 1.2 The M.Sc. and Postgraduate Diploma course can be an ITC course only (fully taught at ITC) or a joint course (partly taught by one or more of ITC's partners and partly by ITC). The course can be taught fully face-to-face or be a combination of face-to-face and distance components. In all cases, ITC monitors and assures the quality of the whole course.
- 1.3 In most cases where the M.Sc. / Postgraduate Diploma course is taught in conjunction with a partner, the two institutes will agree upon new procedures which may take precedence over these 'ITC regulations for courses leading to an ITC Master of Science degree or ITC Postgraduate Diploma'. The Course Director of the course concerned will inform the participants which assessment regulations and procedures apply.
- 1.4 In all cases that are not dealt with in these rules, the Course Director of the course concerned will decide upon an appropriate course of action. Disputes about the interpretation of these regulations shall be referred to the Rector of ITC, who will determine the interpretation and action that should be taken.
- 1.5 In exceptional circumstances, the Academic Board, Degree Assessment Board, Head Education, and/or Course Director may deviate from these regulations, but only with the approval of the Rector.

2. Management, structure and organization of the M.Sc. and Postgraduate Diploma course

- 2.1 The M.Sc. course is organized into four blocks with a total of 23 modules¹ and one or two starting weeks for introductory and remedial activities.

Block 1: modules 1-4
Block 2: modules 5-10
Block 3: modules 11-15
Block 4: modules 16-23

The first year of three blocks and 15 modules consists of coursework. The last 6 months (block 4; 8 modules) focus on individual research.

The Postgraduate Diploma course consists of the first two blocks (10 modules) of the M.Sc. course, one or two starting weeks and a Final Assignment of four weeks duration.

- 2.2 The duration of the M.Sc. course is 18 months fulltime. The duration of the Postgraduate Diploma course is nine months fulltime. Participants in both courses may spread the modules over a maximum of three and a half years.

¹ A module consists of related subjects and has duration of 3 weeks. Courses may contain project-oriented elements of two or more combined modules.

2.3 The formal curriculum of the M.Sc. course and the Postgraduate Diploma course has been approved by the Academic Board. Responsibility for detailed development and implementation of the approved course rests with Head Education, who delegates this responsibility to the Course Director. Responsibility for quality assurance of the course rests with the Academic Board.

The Degree Assessment Board decides on the eligibility of the M.Sc. participant to receive the M.Sc. degree. The Academic Board decides on whether the participant in the Postgraduate Diploma course will receive the Postgraduate Diploma. (See also the appendix 'Bodies and persons involved in management and quality assurance of the M.Sc. course and the Postgraduate Diploma course').

2.4 During and at the end of the course, a participant's competence in the field of study will be assessed through tests, examinations and/or assignments (in written, oral and/or practical form) and/or based on participation. Assessments will be used to:

- Provide feedback to participants so that they may improve their performance (formative assessment), or,
- Grade participants' work with a mark or quality description on a scale which indicates their competence in the field of study (summative assessment).

Before any assessment, participants shall be told which of the above two functions applies.

These regulations describe the conditions and procedures concerning summative assessments.

2.5 At the beginning of the M.Sc. and Postgraduate Diploma course each participant shall receive a study guide that contains:

- Descriptions of the content of the course and modules
- A copy of these regulations
- The name of the M.Sc. degree / Postgraduate Diploma to be received on successful completion of the course
- The course-specific conditions relating to that M.Sc. degree / Postgraduate Diploma
- Which module assessments will result in a mark and which modules in 'completed/fail'.

2.6 The relationship between mark ranges, 'completed / fail' and grades is as follows:

Mark:	Grade:
90 - 100	Excellent
80 - 89	Very good
70 - 79	Good
60 - 69	Pass
00 - 59	Fail
'completed'	Pass or higher
'fail'	Fail

3. Admission to the course and exemptions

3.1 Applicants who meet the entry requirements for the M.Sc. / Postgraduate Diploma course, as stipulated in the current course brochure, may be registered for the M.Sc. / Postgraduate Diploma course at the discretion of the Course Director.

3.2 Participants in the Postgraduate Diploma course who wish to take the whole M.Sc. course have to re-apply for the (second part of the) M.Sc. course. In such cases the maximum time between the starting date of the Postgraduate Diploma course and the graduation date of the M.Sc. course is three and a half years (see rule 3.4).

3.3 Participants may be given exemption for a module of the course when they have shown they have already mastered the content of the module. An exemption for a module may lead to direct admission to the next module or to exchange of the module for a module in another course. Exemptions are subject to the approval of the Degree Assessment Board (M.Sc. course) or the Academic Board (PGD course) and, in case of exchange for a module in another course, approval of the Course Director of that course.

3.4 Exemption for a module will be given when this module was successfully completed by the participant:

(1) As part of another course in the same ITC domain as the M.Sc. / Postgraduate Diploma course and

(2) No longer ago than three and a half years before the participant is expected to complete the M.Sc. / Postgraduate Diploma course.

At least 50% of the M.Sc. / Postgraduate Diploma course has to be taken to be eligible for the M.Sc. degree / Postgraduate Diploma. Therefore, exemption can be given for a maximum of 11 modules of the M.Sc. course and for a maximum of five modules of the Postgraduate Diploma course.

Requests for exemption that do not meet these conditions will be considered on an individual basis, at the discretion of the Degree Assessment Board (M.Sc. course) or the Academic Board (PGD course). In such cases, exemption can be given for a maximum of eight modules in the M.Sc. course and four modules in the Postgraduate Diploma course.

Exemption can never be given for (part of) the research work or Final Assignment.

3.5 In exceptional cases, a participant may also exchange a module of which the content has not been mastered for a module given in another course, provided that the Course Director of that course approves. Such an exchange is up to a maximum of two modules and subject to the approval of the Degree Assessment Board (M.Sc. course) or Academic Board (PGD course).

3.6 Rules 3.2, 3.3 and 3.4 concerning exemptions do not apply to joint courses and other cases where ITC has an agreement with a partner institute that participants who have successfully completed a specific curriculum in the partner institute can be given direct admission to a later part of the M.Sc. or Postgraduate Diploma course.

4. Assessment of modules (excluding research period and final assignment)

4.1 Organization of module assessment

4.1.1 Each module will be assessed by means of a test, examination, assignment and/or based on participation. More than one assessment per module is allowed but must result in a single module mark (0 - 100) or 'completed / fail'. For combined modules (e.g. core modules, thesis), one overall assessment is allowed.

Up to three of the first 11 modules in the M.Sc. course may be assessed by 'completed / fail'. The other module assessments must result in a mark.

The assessment of modules 12 and 13 may not be based on participation only and must result in a mark.

4.1.2 For admission to the research part (see rule 5.3.1) and for the calculation of the average of all modules (see rule 7.2), the result obtained for combined modules will be given to each separate module.

4.1.3 Participants shall be informed of the date, subject, objectives and form of the assessment (practical, written, oral or computer-based, open or closed book), at least one week before an assessment.

4.1.4 The maximum duration of each assessment shall be as follows:

Written theoretical exam	3 hours
Computer-based theoretical exam	2 hours
Practical assignment	determined by the Course Director
Oral theoretical or practical exam	45 minutes

Participants shall be informed at the start of each assessment of:

- the duration of the assessment;
- if there is a choice, the number of questions to be answered;
- the weight of each question;
- whether books and/or notes may be used.

Two staff members must be present at an oral assessment.

4.2 Feedback to participants and re-sits

4.2.1 Participants shall be informed, individually, of the results of an assessment by the staff responsible for the assessment or by the Course Secretary, normally within two weeks of an assessment. The marks awarded for each question or assignment shall be made known to each participant.

4.2.2 Marked scripts shall be shown to participants so that they may know the strengths and weaknesses of their answers. Answers to questions and results of assignments shall be reviewed in a class session, through the distribution of answer sheets or through comments on scripts. Staff responsible for the assessment is required to give an explanation of the marks awarded.

Scripts will be retained for at least one year after the results are officially recorded.

4.2.3 The following rules apply to re-sits:

- (1) Only those participants who fail an assessment at the first attempt (i.e. who achieve a mark less than 60 or 'fail') may re-sit that assessment. Only one re-sit per assessment is allowed.
- (2) Participants who re-sit an assessment may obtain only a maximum mark of 69 (or PASS grade) or 'completed'.
- (3) The previous mark or 'fail' will only be superseded when participants achieve a higher mark or 'completed' in the re-sit.
- (4) Only the final grade will be shown on the Course Record or Certificate, without any indication whether the final grade was obtained through a re-sit or not.
- (5) Participants who have failed due to serious circumstances (at the discretion of the Course Director) can apply for a new assessment, provided they have reported their circumstances in writing to the module coordinator or staff member responsible for the assessment before the scheduled assessment time.

4.2.4 In the case of practical assignments of long duration (practical exercises, a case study with fieldwork) the possibility of repetition can be considered only in exceptional circumstances and subject to approval by the Course Director.

- 4.2.5 A participant not attending a scheduled assessment, not completing an assignment or not presenting the required work within the specified time, will be considered as having failed. The participant will be given a 'fail' or a mark of 40 (or the lowest mark, if lower than 40, scored by the other participants on this assessment). If an acceptable reason (at the discretion of the Course Director) can be offered, the participant can apply in writing for a new assessment or extension of the deadline for submission of the assignment.
- 4.2.6 In case of plagiarism or other types of fraud, the participant(s) concerned will be considered to have failed and a mark 0 (zero) will be given (see also rule 9.5).
- 4.2.7 The grade sheets managed by the Course Secretary are the official record of the results of assessments. In case of discrepancies between this official record and marks and grades presented to participants in other ways, the marks and grades in the official record apply.

5. Research orientation and research period (M.Sc. course)

5.1 Research orientation (block 3)

5.1.1 At a specified date before the start of Module 11 participants must submit:

- (1) A motivated choice of modules 12 and 13,
- (2) The research theme they will join, and
- (3) The preliminary title of the individual M.Sc. research topic and its main thrust.

The choices will be assessed by the Course Director and the research theme leader concerned (or delegate).

Approval of these choices leads to admission to the research theme and two M.Sc. supervisors will be appointed (see rule 5.4.1).

5.1.2 The final M.Sc. research proposal (approximately 8 pages) must be presented in module 15.

5.1.3 Participants have freedom to choose from the advanced subjects on offer in modules 12 and 13, with the limitation that modules will only be given when sufficient participants will participate.

5.2 The individual research period and thesis (block 4)

5.2.1 The M.Sc. research period focuses on individual research. The research requires that the M.Sc. participant carries out the research and reports on progress to the supervisors according to an agreed schedule for the research and preparation of the thesis.

5.2.2 The research work will be assessed on three occasions:

- (1) The detailed research proposal and presentation, leading to admission / no admission to the research period (end of module 15).
- (2) The mid-term presentation. No mark is given. The participant receives feedback from the supervisors. In the case of weak performance, the participant will receive a written warning from the Course Director (see rule 9.1).
- (3) The assessment and oral examination of the thesis.

In addition to these formal assessments, the participant will receive feedback on his/her performance from the supervisors throughout the research period.

- 5.2.3 A participant not presenting the (draft) research proposal, not making the mid-term presentation, not submitting the thesis or not attending the final oral examination within the specified time, will be considered to have failed. Only in exceptional cases, and for reasons beyond the control of the participant (at the discretion of the Course Director), the participant may apply in writing for a new opportunity to meet the above requirements.
- 5.2.4 The thesis, approximately 50 pages of text (approximately 350 words per page and presented in the standard ITC format for theses), excluding appendices, shall constitute an ordered, logical and critical description of the research and should afford evidence of reasoning power, critical attitude, competence in the scientific discipline (application and/or development of knowledge and skills), and knowledge of relevant literature.
- 5.2.5 The thesis may describe work done in conjunction with a supervisor or any other person, but the extent of the participant's personal contribution must be certified by the supervisor concerned.
- 5.2.6 With the explicit approval of the supervisor, a participant may be permitted to incorporate in his/her thesis a limited amount of unpublished work undertaken by the participant prior to the start of the research. A participant may not incorporate in his/her thesis material which has been submitted for achieving the award of a degree from any other educational institution.
- 5.2.7 The source of any photograph, map, or other illustration shall be indicated, as shall the source, published or unpublished, of any material not resulting from the participant's own work.
If material from other work is incorporated verbatim, without proper acknowledgement of the source (plagiarism), the Thesis Assessment Board will decide not to assess the thesis. This means that the M.Sc. degree cannot be awarded (see also rule 9.3 and 9.5).

5.3 Admission to the research period

- 5.3.1 For admission to the research part of the course, at least all but two of the previous modules (see rule 7.2 to see which modules are to be included) must have been successfully completed and no mark below 50 is allowed.
The second requirement for admission to the research part, which is as important as the marks obtained in previous modules, is the ability to undertake independent research. This ability will be developed and assessed during the first 15 modules and finally assessed on the basis of the detailed, written and orally presented, research proposal (end of module 15).
- 5.3.2 The Course Director will nominate, and the Degree Assessment Board will approve, a Thesis Admission Committee. This Committee will assess the proposal and the presentation by the participant. The Thesis Admission Committee is accountable to the Course Director.
- 5.3.3 Each Thesis Admission Committee has 3 to 4 members: the research theme leader or delegate (chair), the first supervisor and the second supervisor (or delegate). The Course Director and involved PhD students or AiO's (see 5.4.1) may be present as advisors.
- 5.3.4 The oral defence of the research proposal is open and will be announced as such.
In exceptional cases the Course Director can decide to have the oral defence of individual participants closed to observers other than ITC staff.

- 5.3.5 When the Thesis Admission Committee is of the opinion that the research proposal is not of a level required for the start of the individual research period, the participant will receive feedback and will have a second opportunity to defend a revised proposal within two weeks. In case the second proposal presentation is not satisfactory, the candidate will not be admitted to the individual research period.
- 5.3.6 A participant who is not eligible for admission to the individual research period of the course but has completed modules 1 to 14 of the M.Sc. course successfully (see rule 8.1) will receive a Postgraduate Diploma.
- 5.4 Supervision of the proposal phase and the research work
- 5.4.1 In module 11, based on the research pre-proposal, in consultation with the research theme leader and the M.Sc. participant, the Course Director shall recommend a primary and secondary supervisor to the supervisor's department(s). PhD students and AiO's may be involved in the supervision as advisor and support the work of the supervisors. Supervisors and advisors are appointed by the management team of the department.
- 5.4.2 The two supervisors and, if applicable, the advisor shall divide the supervision tasks and make a supervision plan and meeting schedule with the participant.
- 5.4.3 Supervisor(s) shall:
- (1) Guide the M.Sc. participant in the formulation of a detailed research proposal.
 - (2) Establish a schedule of regular supervisory meetings with the M.Sc. participant (on an average once per fortnight). Additional meetings may be arranged by agreement.
 - (3) Provide general advice and guidance on the execution of the research.
 - (4) Provide feedback on draft written work, normally within 10 days of receipt.
 - (5) Where appropriate, forward any comments on the performance of the participant to the Course Director.
 - (6) Inform the Course Director when the progress of a participant gives cause for concern so that action can be taken in accordance with these regulations (see rules 9.1 and 9.2).
- 5.4.4 If a M.Sc. participant considers that he/she is not receiving the quality of supervision required in the regulations, the participant should report this to the Course Director.
- 5.4.5 Replacement of a supervisor may be considered if the research is found to be outside a supervisor's area of expertise, or at the request of the supervisor and/or of the participant.
- 5.5 Submission of the thesis
- 5.5.1 The participant must submit a well-organized copy of all digital files associated with the research work on DVD, and a hard-copy of graphic output, at least two weeks before the examination date or as specified by the Course Director.
- 5.5.2 ITC will produce sufficient printed copies of the thesis, including two for the participant. The participant must bring one of his/her copies of the thesis to the oral examination.
- 5.5.3 One copy of the thesis will be sent to each member of the Thesis Assessment Board. The Institute will retain two bound copies if a degree is awarded, one of the copies being lodged with the Institute Librarian and the second copy in the course archive.

- 5.5.4 Where work submitted has been done in cooperation with others, the supervisor must submit a written statement to the Thesis Assessment Board indicating the extent of the participant's share of the work.

5.6 Thesis examination

- 5.6.1 For the thesis examination, the Course Director nominates and the Degree Assessment Board approves a separate Thesis Assessment Board for each participant. The Thesis Assessment Board is accountable to the Course Director.

Each Thesis Assessment Board has 3 to 5 members: one or both supervisor(s), an ITC professor or associate professor in a relevant discipline, an external examiner and, if necessary, other staff members of the ITC. The involved AiO or PhD student (see 5.4.1) and the Course Director may advise. In many cases, the external member comes from outside ITC, preferably being an academic staff member of a university. In the remaining cases, the external member comes from an ITC department that does not play a major role in the course and research theme.

The Thesis Assessment Board is chaired by the ITC (associate) professor. In exceptional cases one of the other members, but not the first supervisor, can be the chair.

- 5.6.2 The thesis examination consists of the assessment of the thesis and the oral examination that includes a presentation and defence. The oral examination has a maximum duration of one and a half hours.
- 5.6.3 The Course Director assigns a date for an oral examination and informs the participant at least one month in advance of this date.
- 5.6.4 All members of the Thesis Assessment Board shall read and assess the quality of the thesis as an ordered, logical and critical exposition of research work in the approved field.
A minimum of three members of the Thesis Assessment Board must be present at the oral examination. (In case the ITC (associate) professor cannot attend, Head Education will appoint another ITC (associate) professor to replace him or her.) These members of the Thesis Assessment Board will assess the participant's reasoning power, critical attitude, competence in the scientific discipline, and knowledge of the relevant literature, will raise questions concerning the thesis and will decide on the mark.
- 5.6.5 The oral examination is open and will be announced as such.
In exceptional cases the Course Director can decide to have the defence of individual participants closed to observers other than ITC staff.
- 5.6.6 On the basis of the assessment of the participant the Thesis Assessment Board shall take one of the following decisions:
- (1) The thesis is satisfactory. One single mark is given.
 - (2) Subject to minor corrections (that can be implemented within three working days and implemented before the official end of the course) in the thesis, the thesis is satisfactory. One single mark is given, subject to the corrections in the thesis being made.
 - (3) The thesis is not satisfactory and is given the FAIL grade.

- 5.6.7 No changes may be made in the thesis after submission for the thesis examination, only an errata list may be added. If the Thesis Assessment Board requires minor corrections to the thesis, these, and only these, corrections must be made and must be checked and approved by one of the supervisors. In all other cases changes can only be made when the thesis is to be re-examined by the Thesis Assessment Board.
- 5.6.8 Extensions to the research period can be given before the thesis is submitted and/or as result of the thesis examination. In case the participant does the research work at a distance, extension can only be given before the thesis is submitted.
Extensions will be given only when:
- (1) Funding for the extension is available,
 - (2) The main cause of the unsatisfactory level of the thesis has been beyond the control of the participant (at the discretion of the Course Director),
 - (3) The extension could lead to an acceptable thesis and re-examination (at the discretion of the Thesis Assessment Board)
- The participant will take the initiative and apply in writing for extension. If the Course Director is of the opinion that the second and third conditions are met, he/she will forward the request to Head Education for decision.
- 5.6.9 The maximum total duration of extensions to the research period is three months. Extensions are allowed only when the participant stays at ITC or, in the case of a joint course, at the institute of the partner.

This does not apply to participants who study part-time. They are allowed to work on the thesis in the home organization and since the M.Sc. course may be spread over a period of maximum three and a half years (see rule 2.2) they may work on the thesis until about a month before the end of the three and a half year period. In such cases, no extensions are possible.

5.7 Access to the thesis

- 5.7.1 The primary function of the Institute is the development and dissemination of knowledge. Theses are lodged with the Institute Librarian and shall be made available for consultation, inter-library loan and photocopying. Theses that meet the following criteria will also be made available in digital format at the ITC website:
- (1) Have been awarded a mark of 75 or more
 - (2) Contain no material of which the copyright rests with third parties
 - (3) Contain no confidential data or information.
- 5.7.2 Any staff member who publishes results from M.Sc. research work or the related thesis is obliged to make a proper reference to the M.Sc. participant's work.

6. Final Assignment (Postgraduate Diploma course)

6.1 The Final Assignment and result

- 6.1.1 The Final Assignment period focuses on the application of knowledge, methods and techniques in the subject of the course to the task performed or to the topic investigated. Depending on the course, the Final Assignment will be done individually or in small groups.
- (1) At the start of the Final Assignment period, participants will receive terms of reference from supervising and coordinating staff.
 - (2) Subsequently, participants will have to plan and carry out the assignment according to the terms of reference.

- (3) Part of the output of the assignment will be a final report and a documented database.
- (4) The output of the assignment will be presented and discussed in public.

6.1.2 A participant or group not completing the Final Assignment within the specified time, will be considered to have failed. Only in exceptional cases and for reasons beyond the control of the participant/group (at the discretion of the Course Director), the participant/group may apply in writing for a new opportunity to meet the above requirements.

6.1.3 A participant or group may not incorporate material that has been submitted for achieving certification from any other educational institution, in the Final Assignment result.

6.1.4 The source of any photograph, map, or other illustration shall be indicated, as shall the source, published or unpublished, of any material not resulting from the participant/group's own work.
If material from other work is incorporated verbatim, without proper acknowledgement of the source (plagiarism), the Course Director may decide that the Final Assignment will not be assessed. This means that the Diploma cannot be awarded.

6.2 Supervision of the Final Assignment

6.2.1 The coordinator of the Final Assignment period, in consultation with the Course Director, will set up a scheme indicating which staff is available for consultation and supervision throughout the Final Assignment period. The supervising staff have to be appointed by the management team of their department.

6.2.2 The supervising staff shall:

- (1) Provide the participant/group with clear terms of reference.
- (2) Establish a schedule of supervisory meetings with the participant/group.
- (3) Provide general advice and guidance on the execution of the Final Assignment.
- (4) Provide feedback on work, normally within three days of submission.
- (5) Forward, where appropriate, any comments on the performance of the participant(s) to the Course Director.
- (6) Advise the Course Director when the progress of a participant gives cause for concern so that action can be taken in accordance with these regulations (see 9.1 and 9.2).

6.2.3 If a participant/group considers that he/she is not receiving the quality of supervision required in the regulations, the participant/group should seek action from the Course Director.

6.3 Submission of the Final Assignment result

6.3.1 The participant/group must submit a well-organized copy of all digital files associated with the Final Assignment work on DVD, and copies of hard-copy graphic output, to the supervising staff on the date of the Final Assignment assessment or as specified by the coordinator of the Final Assignment period in consultation with the Course Director.

6.3.2 Where the Final Assignment has been executed in groups or where individual Final Assignment work submitted has been executed in cooperation with others, the supervisor(s) must provide a written statement, indicating the extent of the share of the work that each participant has done.

6.4 Assessment of the Final Assignment

6.4.1 Participants will be assessed individually based on the output of and the presentation of the Final Assignment.

6.4.2 The Course Director assigns a date for the Final Assignment assessment and informs the participant/group of this date at least two weeks in advance.

6.4.3 Criteria for the assessment of the Final Assignment will be provided at the start of the Final Assignment period, i.e. at the time of providing the participants with the terms of reference for the final assignment.

6.4.4 The Final Assignment result will be assessed by two or three staff members: at least one (associate) professor in a relevant discipline and at least one staff member who has been involved in the supervision during the execution of the Final Assignment.

6.4.5 The presentation of the Final Assignment is open and will be announced as such. In exceptional cases the Course Director can decide to have the presentation of individual participants closed to observers other than ITC staff.

6.4.6 On the basis of the assessment of the participant(s) the assessing staff shall take one of the following decisions:

- (1) That the Final Assignment is satisfactory. One single mark is given.
- (2) That subject to minor corrections (that can be implemented within three working days and implemented before the official end of the course) in the Final Assignment result, the Final Assignment is satisfactory. One single mark is given, subject to the corrections in the Final Assignment result being made.
- (3) The Final Assignment is not satisfactory and is given the FAIL grade.

6.4.7 In exceptional cases extension may be given for the Final Assignment work, but only before the Final Assignment assessment and only when:

- (1) Funding for the extension is available, and
- (2) The main cause of the unsatisfactory level of the Final Assignment has been beyond the control of the participant/group, at the discretion of the Course Director.

The participant will take the initiative and apply in writing for extension. If the Course Director is of the opinion that condition 2 is met he/she will forward the request to Head Education for decision.

6.4.8 Extensions have a maximum duration of 50% of the standard duration of the Final Assignment. Extensions are only allowed when the participant/group stays at ITC.

This rule does not apply to participants who study part-time. They are allowed

to work on the Final Assignment in the home organization until the end of the period of three and a half years counting from the official starting date of the course (see rule 2.2). In such cases, no extensions are possible.

7. M.Sc. degree and Postgraduate Diploma assessment

- 7.1 On the basis of the assessment results of the participant, the Degree Assessment Board decides whether the participant will be awarded the M.Sc. degree.

On the basis of the assessment results of the participant, the Academic Board decides whether the participant will be awarded the Postgraduate Diploma.

In case the Degree Assessment Board (M.Sc. course) or Academic Board (PGD course) decides that the M.Sc. degree or Postgraduate Diploma will not be awarded, the Course Director will decide whether the participant will be awarded a Certificate or Certificate of Attendance.

- 7.2 For the award of a M.Sc. degree the average of all module marks (including the thesis that counts for 8 module marks) must be at least 60, no more than 2 modules may have a mark below 60 and no module mark below 50 is allowed. This implies that the thesis must have a mark of at least 60.

The criteria for the award of a Postgraduate Diploma are:

- (1) The average of all final module marks must be at least 60. When a module is assessed with 'completed' or 'fail': a 'completed' will not be included in the average, a 'fail' will be counted as a mark of 50. In case of one overall assessment for combined modules, the overall mark will be given to each separate module, before calculation of the average.
- (2) No more than two of the modules may have a mark below 60. No final module mark below 50 is allowed.
- (3) The final assignment must have a mark of at least 60.

Only results of modules that are part of the formal curriculum of the M.Sc. or Postgraduate Diploma course are included in the calculation of the average and counted for the number of marks below 60 and below 50. Therefore results of a module that is taken in addition to the formal curriculum or in exchange for a module of the formal curriculum for which exemption was given, will not be included. However, a module that was taken in exchange because of a reason other than exemption (see rule 3.4), is (only for the application of this rule 7.2) considered as part of the formal curriculum.

When a module is assessed with 'completed', this will not be included in the average. When a module is assessed with 'fail', this will be counted as a mark of 50.

If results of modules were obtained more than three and a half years before the end of the course, then the validity of these modules must be confirmed by the Degree Assessment Board (M.Sc. course) or Academic Board (PGD course). (See rule 3.4.)

- 7.3 To be entitled to receive a M.Sc. degree or Postgraduate Diploma with distinction the average of all module assessments (see rule 7.2 which modules are to be included) must be 80 or above. The thesis or Final assignment must have a mark of 80 or above. No marks below 70 or 'fails' are allowed.

Participants who have made changes in the formal curriculum of their M.Sc. or Postgraduate Diploma course (exemptions or exchanged modules) that affect more than four (M.Sc. course) or two (PGD course) modules are not entitled to receive a M.Sc. degree or Postgraduate Diploma 'with distinction'.

- 7.4 The Degree Assessment Board (M.Sc. course) / Academic Board (PGD course) shall take one of the following decisions:
- (1) That the thesis / final assignment and overall course performance of the participant are satisfactory. The degree of M.Sc. / Postgraduate Diploma shall be awarded.
 - (2) That the thesis / final assignment and overall course performance of the participant are such that the M.Sc. degree / Postgraduate Diploma shall be awarded "with distinction".
 - (3) That subject to minor corrections in the thesis / final assignment, the thesis/ final assignment and overall course performance are satisfactory. The degree of M.Sc. / Postgraduate Diploma shall be awarded subject to the corrections in the thesis / Final Assignment result being made before the official end of the course.
 - (4) For M.Sc. candidates: That the research work / final assignment and/or overall course performance are not satisfactory. The degree of M.Sc. shall not be awarded. The participant will receive a Postgraduate Diploma.
For Postgraduate Diploma course participants: That the final assignment and/or overall course performance are not satisfactory. The Postgraduate Diploma shall not be awarded. The participant will receive a Certificate.

8. Awards and certification

- 8.1 A “**Master of Science Degree**” will be awarded to a participant who has been officially admitted to a M.Sc. course (as approved by the Academic Board) and has fulfilled the assessment requirements of that course.

A “**Postgraduate Diploma**” will be awarded to a participant who has been officially admitted to a PGD course (as approved by the Academic Board) and has fulfilled the assessment requirements of that course.

A “Postgraduate Diploma” (‘with distinction’ will not be possible in this case) will also be awarded to a participant who (1) has been officially admitted to a M.Sc. course, (2) has not been admitted to the research period or has failed the thesis, and (3) has completed modules 1 to 14 of the M.Sc. course successfully (average of all module marks is at least 60, not more than two marks between 50 and 60 and no marks below 50).

A “**Certificate**” will be awarded to a participant who (1) has been officially admitted to a M.Sc. course or Postgraduate Diploma course but has not fulfilled all assessment requirements for that course, and (2) who has fulfilled the assessment requirements of at least one summatively assessed module of that M.Sc. or Postgraduate Diploma course.

The Certificate will mention that the participant ‘has followed a course in Geo-information Science and Earth Observation’ and the study load. Only the modules that have been completed and the modules in which the participant has participated for at least 80%, will be included in the study load.

A “**Certificate of Attendance**” will be given to participants who have been officially admitted to a M.Sc. course or Postgraduate Diploma course, but have not fulfilled the assessment requirements of any summatively assessed module.

The Certificate of Attendance will mention that the participant ‘has attended a course in Geo-information Science and Earth Observation’ and the study load. Only the modules in which the participant has participated for at least 80% will be included in the study load.

No qualification other than “with distinction” will be indicated on any M.Sc. degree or Postgraduate Diploma.

- 8.2 M.Sc. degrees and Postgraduate Diplomas are issued under the responsibility of the Rector. Certificates and Certificates of Attendance are issued under the responsibility of the Course Director.

- 8.3 M.Sc. degrees and Postgraduate Diplomas are signed by the Rector of the ITC and Head Education.
Certificates and Certificates of Attendance are signed by the Course Director.
- 8.4 M.Sc. degrees, Postgraduate Diplomas and Certificates are accompanied by a Course Record, signed by the Course Director. The Course Record will show the period of study, the study load, the titles of and marks or grades obtained for the modules that have been finished successfully or that the participant has participated in for at least 80% but not finished successfully.

The assessments 'completed' or 'fail' will appear as such in the Course Record.

- 8.5 Only the names and marks and/or grades of the modules that are taken are mentioned on the Course Record.
In case of exemption the number and not the name of the module will be mentioned (e.g. "Modules 1-3: exemption"). In case a new module was taken in exchange of a module for which exemption was given, the name of the new module will be mentioned also (e.g. "Module 3: exemption. Extra module: Database design"). In case of exchange of a module for another reason than exemption only the name of the new module will be mentioned (e.g. "Module 3: Database design").
The names of modules (and the results obtained) that are taken in addition to the formal curriculum of the course are also listed on the Course Record (e.g. "Extra module: Database design").

9. Early termination of the course

- 9.1 Where a Course Director and/or Head Education are/is of the opinion that a participant's progress gives cause for concern the participant shall be informed of the situation by the Course Director. Where a participant's performance is such that she/he is unlikely to obtain a M.Sc. Degree / Postgraduate Diploma without a significant improvement in performance, the participant shall be advised in writing by the Course Director of the situation and the implications.
(Oral or written advice by the Course Director may not be given when the concern arises after the mid-term presentation of the thesis or after the approval of the Final Assignment plan.)

- 9.2 In cases of obvious non-performance, a Course Director and/or Head Education may decide at any time that a participant must discontinue his/her course. Such a decision will not be taken without consulting the Degree Assessment Board (M.Sc. course) or Academic Board (PGD course) and the participant having received one written warning and being given time to improve performance.

- 9.3 In case of fraud during an exam or in assignments, the participant(s) concerned will be considered to have failed and a mark 0 (zero) will be given.

In case of plagiarism in the submitted thesis, the Thesis Assessment Board will decide not to assess the thesis. Extensions of the thesis period are then not possible. This means that the M.Sc. degree cannot be awarded. The participant will get a Postgraduate Diploma.

In case of plagiarism in the submitted final assignment of the Postgraduate Diploma course, the Course Director may decide that the final assignment will not be assessed. This will mean that the Diploma cannot be awarded, the participant will get a Certificate.

- 9.4 In case of other types of misbehaviour, the Course Director will consider expulsion from the course.
- 9.5 In case of severe or repeated fraud, plagiarism or other types of misbehaviour, the Course Director, in consultation with the Academic Board, will decide that the

participant is expelled from the course.
Expulsion from the course means that the participant will not receive any certification.

9.6 ITC will use plagiarism detection software or other tools to detect fraud.

In submitting a text, the participant implicitly consents to the text being entered in the database of the detection software concerned.

10. Student appeal procedures

10.1 In case of problems of a general or structural nature in the course, the Student Association Board (SAB) may be consulted.

10.2 In the event that a participant disagrees with decisions taken by a staff member or Thesis Assessment Board, he/she may present this decision for reconsideration to the Course Director.

Where a participant finds that he/she is not receiving the quality of thesis / final assignment supervision required in the regulations, the participant should also seek action from the Course Director.

Only in the event that a M.Sc. participant disagrees with decisions taken by the Degree Assessment Board he/she may present this decision for reconsideration to Head Education directly (see rule 10.3)

10.3 If not satisfied with the decision of the Course Director, the participant can seek action from Head Education. If Head Education rejects the complaint of the participant he/she will respond in writing describing the reasons.

10.4 If still not satisfied, participants have a final right of appeal with the Student Appeals Board. An appeal will only be accepted if:

- The formal methods of dealing with complaints (see rules 10.2 and 10.3) have not led to agreement;
- The appeal concerns the implementation of these 'ITC Regulations for Master of Science (M.Sc.) degree and Postgraduate Diploma courses' or the assessment of the thesis / Final assignment and
- The appeal has been made before the official end of the course. Appeals concerning the assessment of the thesis can be made later up to a maximum of four weeks after the mark was received.

Appeals should be addressed in writing to the Chairman of the Student Appeals Board, through the Rector, and be accompanied by the argued written response to the appeal by Head Education.

10.5 Where unequal treatment of participants is claimed, copies of all relevant scripts shall be made available for review by those investigating the appeal.

10.6 The Student Appeals Board consists of three staff members to be appointed by the Rector. These staff members should not have been involved in the situation leading to the appeal. For appeals concerning the assessment of the thesis, staff members representing fields related to the subject of research will be invited to sit on the Student Appeals Board.

10.7 After having heard all parties involved (including the Course Director) for relevant information, the Student Appeals Board will take a final decision on the appeal. The decision on an appeal will be passed on to the Rector only if the Appeals Board cannot reach consensus. No further appeal will be possible.

10.8 The Student Appeals Board can reject the appeal or support it. In the latter case, the Student Appeals Board shall suggest remedial actions, which may include extension of the fellowship.

- 10.9 The Student Appeals Board should deal with the case within two weeks of receipt of the appeal. If necessary the fellowship will be extended for the duration of the appeal procedure. In case of an appeal concerning the assessment of the thesis, the fellowship may only be extended when the appeal is made before the official end of the course.
- 10.10 Support to a request for reconsideration or appeal concerning the assessment of the thesis cannot lead to overruling the assessment of the thesis by a Thesis Assessment Board that is composed according to these regulations. Acceptable remedial actions do include a re-sit for the oral part of the thesis examination (only when a reason beyond the control of the participant has caused underperformance in the oral part) or an extension to the research period (only when the main cause of unsatisfactory level of the thesis has been beyond the control of the participant) in combination with a full re-examination.

Support to a request for reconsideration or appeal concerning the assessment of the final assignment in the Postgraduate Diploma course cannot lead to overruling the assessment of the final assignment, carried by (a) supervisor(s) according to these regulations. Acceptable remedial actions do include a re-examination (only when a reason beyond the control of the participant has caused underperformance in the oral part) by the supervisor(s) or two other ITC staff members with sufficient expertise in the subject of the Final Assignment.

Bodies and persons involved in management and quality assurance of the M.Sc. course and the Postgraduate Diploma course

The mentioned tasks and responsibilities must be carried out in accordance with these 'ITC Regulations for the Master of Science (M.Sc.) degree and Postgraduate Diploma courses'.

Rector

The Rector has the overall responsibility for all tasks of ITC. The Rector has delegated the academic, quality and policy aspects of the educational programmes and courses to the Academic Board and the implementation of the programmes and courses to Head Education. The Rector appoints the Head Education, Course Director, Director Graduate Programme and Student Appeals Board.

Scientific Council

The Scientific Council advises the Rector and Academic Board on the quality of education and research of the ITC. This responsibility includes:

- Advice on degrees offered by the ITC
- Advice on course curricula, including admission and thesis examination criteria.
- Advice on ITC's quality assurance system
- Advice on degree and assessment regulations, including these 'ITC Regulations for the Master of Science (M.Sc.) degree and Postgraduate Diploma courses'

The Scientific Council is a mainly external body; two third of the members are professors of Dutch universities.

Academic Board (AB)

The Academic Board is responsible for the quality of ITC's courses and for development of policy on education. This responsibility includes:

- Advice on the degrees offered by the ITC
- Approval of the curricula of M.Sc. and Postgraduate Diploma courses
- Approval of ITC's quality assurance system and monitoring of the implementation
- Advice on course-specific elements of the quality assurance system
- Approval of policy on education
- Approval of degree and assessment regulations, including these 'ITC Regulations for the Master of Science (M.Sc.) degree and Postgraduate Diploma courses'
- Acting as Degree Assessment Board
- Decision on deviation of the formal curriculum by individual participants in the Postgraduate Diploma course.
- Decision on award of the Diploma to individual participants in the Postgraduate Diploma course.

The Academic Board consists of the Rector (chair) and all full and visiting professors of ITC.

Research theme leader

The Research Theme leader is responsible for all research carried out by the scientific staff and participants connected to that theme. This responsibility includes:

- Approval of the research pre-proposal; admission of the participant to the research theme
- Monitoring of the quality of the research supervision given to M.Sc. participants under the theme

Research theme leaders are ITC professors.

Head Education

Head Education is responsible for:

- Monitoring of the implementation of the M.Sc. course and Postgraduate Diploma course, ITC's quality assurance system and ITC's educational policy as approved by the Academic Board and the Rector. Head Education delegates the actual implementation to the Course Director
- Coordination and implementation of supra-course aspects. Head Education delegates the coordination of supra-course aspects of block 3 and block 4 of all M.Sc. courses to the Director Graduate Programme

Course Director (CD)

The Course Director is responsible for:

- Implementation of the M.Sc. course and Postgraduate Diploma course, ITC's quality assurance system and ITC's educational policy, as delegated by Head Education
- Implementation of decisions taken by Head Education
- Day-to-day co-ordination and execution of the course
- Counselling of participants in matters concerning their studies

Director Graduate Programme

The Director Graduate Programme is responsible for:

- Coordination of the development and implementation of supra-course aspects of block 3 (research orientation) and block 4 (individual research period) of the M.Sc. course

Degree Assessment Board

The Degree Assessment Board assures that participants who are awarded the M.Sc. degree have the required level.

This responsibility includes:

- Decision on deviation of the formal curriculum by individual participants
- Appointment of the Thesis Admission Committee
- Appointment of the Thesis Assessment Boards
- Decision on award of the degree to individual participants

The Academic Board acts as Degree Assessment Board.

Thesis Admission Committee

The thesis Admission Committee is responsible for assessment of the thesis proposal and admission to the research part of the M.Sc. course.

Thesis Assessment Board

Responsible for assessment of the thesis and oral examination of the participant on completion of the research.

Student Appeals Board

The Student Appeals Board is a semi-permanent committee, which will be appointed by the Rector when an appeal from a participant is received.