Examination Regulations
for the Master Program in Geospatial Technologies
at the

Westfälische Wilhelms-Universität Münster, Germany
Universitat Jaume I, Castellón, Spain, and
Universidade Nova de Lisboa, Portugal

06. Juni 2007

Contents

I. Master Program

§ 1 Goal of the Master Program

The Master examination forms a continuative career-qualifying degree of the program of study in Geospatial Technologies. Graduates of the International Master program apply and develop methods for computer-supported solutions for spatially related problems (global, regional, local). The Master examination proves, if the candidate has acquired the necessary specialized knowledge and additional core competences in order to start or precede a professional career in the public and private sector, or research.

§ 2 Master degree

The successful Master candidate will be awarded with the academic degree "Master of Science" (M.Sc.) with the adjunct "in Geospatial Technologies".

§ 3 Requirements for admission

(1)   A requirement for admission is an adequate Bachelor degree of six semesters or more in Germany, Portugal, or Spain, or an equivalent Bachelor degree from other countries.

(2)   The study program is in English language. Therefore, a TOEFL certificate (500 points), or equivalent, is required. In case of uncertainty, the Examination board or Master program coordinator according to § 8 decides about equivalence.

(3)   Applicants will be evaluated based on the following criteria:

1.   Highschool and Bachelor grades

2.   English language proof

3.   Motivation letter

4.   CV analysis

5.   Reference letters.

In case of verification of 150 ECTS credit points and fulfilment of the other criteria, a Bachelor student can be admitted tentatively. For final admission, the Bachelor diploma has to be provided until the 1st of September of the respective program year.

Details of each year's evaluation procedure will be published on the homepage of the University of Münster, Universidade Nova de Lisboa, and Universitat Jaume I.

(4)   Detailed admission requirements are defined by the respective enrollment and legal regulations, to be published on the universities' respective homepages.

§ 4 Previous knowledge

The Master Program in Geospatial Technologies is recommended to students with relevant Bachelor degrees in application areas of geographic information. In case of uncertainty, the Examination board or Master program coordinator according to § 8 decides about relevance.

§ 5 Duration and structure of the study program

(1)   The duration of the study program including all examinations and Master thesis is 3 semesters.

(2)   The study program is structured into

1. An introductory course semester, either at the Universidade Nova de Lisboa or Universitat Jaume I.

2. An advanced course semester at the University of Münster

3. A one-semester Master thesis including its defense. The Master thesis consists of a supervised independent work on a scientific problem. Considering students' preferences, the students will be equally distributed to the three universities.

(3)   The volume of the study program is 90 credit points, 30 credit points per semester. One credit points equals a students' workload of 30 hours in Germany, 28 hours in Portugal, and 25 hours in Spain.

§ 6 Examinations and deadlines

(1)   The Master examination including Master thesis and its defense (see § 14) should be terminated within three semesters.

(2)   The Master examination consists of course-related, program-accompanying examinations, which can consist of several components, according to the credit point system.

§ 7 Program-accompanying examinations (excluding Master thesis)

(1)   Certificates will be issued, which recognize the students achievements program-accompanying examinations being part of the Master examination. Program-accompanying examinations are individual achievement related to single courses according to § 14. The grades of program-accompanying examinations have to be announced to the students within six weeks after the completion of the last examination component. Examinations in the module "Master thesis" (see § 14) are not subject of the following sub-paragraphs 2-7, but will be described separately in § 16 and 17.

(2)   Program-accompanying examinations and its components can be provided by written and oral exams, colloquia, presentations, homework, and reports (including programming).

(3)   The teacher of each course defines the components of an program-accompanying examination, and criteria for grading. She/he announces these conditions at the beginning of each course.

(4)   Within examinations, the candidate has to show that she/he has gained a coherent knowledge of the respective topic and is able to address problems in this specific area. As a general rule, examinations only include what has been taught before.

(5) All examinations are in English language.

(6) Written examinations might include multiple-choice questions. The duration is between 60 and 240 minutes.

(7) Oral examinations are supervised by examiners according to § 9, co-supervised by a competent assessor. The duration is between 15 and 30 minutes. The major topics and results of the oral examination have to be documented. The grade of the oral examination has to be announced to the student directly afterwards.

§ 8 Examination board or Master program coordinator

(1) Each of the partner universities forms an examination board (in the case of University of Münster, and Universitat Jaume I) or a Master program coordinator (in the case of Universidade Nova de Lisboa) that organizes and supervises the examinations within these examination regulations. The respective Examination board or Master program coordinator is responsible for the examinations the university is performing. The examination board or Master program coordinator consist of the following representatives:

1. Universitat Jaume I forms an examination board consisting of a chair, her/his proxy, and three additional members. Chair, proxy, and the additional members are elected from the group of professors directly involved in organizing and teaching the Master.

2. Universidade Nova de Lisboa: The Master program coordinator, together with the academic services, under supervision of ISEGI's scientific council, is responsible for organizing and all examinations

3. Westfälische Wilhelms-Universität Münster: The Faculty of Geosciences forms an examination board consisting of a chair, her/his proxy, and five additional members. Chair, proxy, and two additional members are elected from the group of professors, one member from the group of research assistants, and two members from group of students. The election for the group of professors is valid for three years, for the other group one year. Re-elections are possible.
Members from the group of students do not cooperate in the grading and recognition of students' achievements, definition of examination tasks, and selection of examiners. The examination board has a quorum, if chair or proxy, two additional members of the group of professors, and two additional members are present. Decisions are made by simple majority; in the case of equality of votes the chair affects the majority vote.

(2) The examination boards or Master program coordinator supervise the examination regulations and its execution. The boards report to the respective faculties, and, if applicable, provide suggestions for innovations. The examination boards can transfer the regular tasks to its chair.

(3) The members of the examination boards or Master program coordinator can attend all examinations.

(4) The members of the examination boards or Master Program coordinator underlay discreetness. If the members are not obliged to discreetness by their position, the chair has to oblige the members to discretion. Examination board meetings are not public.

§ 9 Examiners and assessors

(1) In general, a lecturer of a course is responsible for examinations according to § 7.

(2) Examiners according to § 7 are

1. at the University of Münster:
   i. Professors, Assistant Professors
   ii. Junior professors and Scientific assistants
   iii. Research assistants and lecturers entitled to teach.
2. at the Universidade Nova to Lisboa: All Professors designated by the scientific council as responsible for a specific course.
3. at the Universitat Jaume I: Chair, proxy, and the three additional members are elected from the group of professors directly involved in organizing and teaching the Master.

(3)   As for the University of Münster, and Universitat Jaume I, the examination board appoints the examiners and assessors of the module „Master thesis" according to § 9-5. As for the Universidade Nova to Lisboa, The President of the Scientific Council together with the student designates the Masters thesis supervisor. Responsible is that examination board or Master program coordinator, where the supervisor of the thesis is engaged.

(4)   A Master thesis is supervised by a thesis board. The thesis board consists of a supervisor and at least two additional co-supervizors. If a student did not attend courses of one of the three partner universities before, one of the supervizors or co-supervizors has to be a member of that university.

(5)   The Master thesis can be supervised and co-supervised by :

1. each professor, assistant professor, junior professor and scientific assistant, regularly occupied at the Institute for Geoinformatics, University of Münster; Universitat Jaume I, and at ISEGI-Universidade Nova de Lisboa by any professor holding at docotorate degree.

2. with permission of the examination board by a research assistant with a Master degree at the Institute for Geoinformatics, University of Münster and Universitat Jaume I, not at the Universade Nova de Lisboa.

3. with permission of the examination board by external professors and assistant professors. Supervision can be supported by research assistants of the three Universities, whereas at the Universidade Nova de Lisboa they have to hold doctorate degrees.

(6)   On request, the chair of the examination board or Master program coordinator assures that a candidate receives a topic for a Master thesis. The date has to be documented.

(7)   The candidate might suggest supervisors and co-supervisors, although this is no legal entitlement.

(8)   The chair of the examination board or Master program coordinator assures that the candidate will be informed about the names of the examiners, latest two weeks before the examination.

(9)   Assessor of oral examinations according to § 7 und the defense of a Master thesis can be persons, who have a Master degree or equivalent in the examination topic.

§ 10   Recognition of study times, study achievements, and foreign exam

results

(1)   Study times, study achievements, and foreign exam results will be recognized, if equivalence is assessed. The verification of equivalence is decided by the examination board or Master program coordinator according to § 8. Equivalence has to be verified, if study times, study achievements, and foreign exam results are equivalent to those requirements of the

International Master program in terms of contents and scope. The verification of equivalence is not a schematic comparison, but an overall evaluation.

(2) In the case of recognition of study achievements and foreign exam results, the grades have to be included into the grading of the Master examination. In case of different grading systems, the examination board or Master program coordinator according to § 8 determines appropriate grades. If an appropriate grade cannot be determined, the examination board according to § 8 can schedule an additional examination for the determination of credit points and grades.

§ 11   Absence, withdrawl, deception, offence

(1) An examination is considered as "failed", if the candidate does not show up to an examination date or withdraws after the beginning of an examination without cogent reasons. An examination is also considered as "failed", if a written examination is not provided within the foreseen deadline.

(2) Reasons for absence or withdrawl have to be claimed immediately to the examination board or Master program coordinator. In the case of illness, the candidate has to provide a medical certificate. In case of approval of justification, the candidate will be informed, and a new examination date will be determined.

(3) In case of deception or usage of not-permitted means, the examination is considered as "failed". Evidence will be assessed and documented by the respective examiners. A candidate, who is disturbing an examination, can be excluded. In this case, the examination is considered as "failed". Reasons for exclusion have to be documented. In severe cases, the examination board or Master program coordinator can exclude a candidate from further examinations.

(4) A candidate can request that decisions according to § 11-3 must be checked by the examination board or Master program coordinator within 14 days. The candidate has to be informed immediately about a negative decision, its reasoning, and to be provided with legal instructions.

II. Master Examination

§ 12   Admission

(1) Only enrolled students of the University of Münster, Universitat Jaume I, or Universidade Nova de Lisboa, fulfilling the requirements according to § 3 can be admitted to the Master examination. The enrollment in the first semester has to take place at the Universitat Jaume I, Castellón, or the Universidade Nova de Lisboa.

(2) The admission to the Master thesis requires a seperate application to the responsible examination office. For the admission, 60 credit points of the previous two semesters have to be proven. The written application for admission to the Master examination has to be submitted to the chair of the examination board or Master program coordinator. The application has to include:

1. Certificates about the fulfillment of the requirements in § 12-1.

2. A record of study

3. A declaration about previous and ongoing successful or unsuccessful attempts for a Master examination in the field of Geospatial technologies or Geoinformatics (only at the University of Münster)

4. If applicable, the candidate's suggestions for examiners or oral examinations

5. A letter from the supervisor and co-supervisors (if applicable) stating that thesis is ready for discussion.

(3) Is the candidate not able to provide the documents according to § 12-1, the chair of the examination board or Master program coordinator may allow the candidate to prove evidence in another appropriate way.

§ 13   Admission procedure

(1) The examination board or Master program coordinator according to § 8 decides about the admission of a candidate to the Master examination.

(2) Admission has to be rejected, if

1. the requirements in § 12 are not fulfilled, or

2. the required documents of the application are not complete, or

3. the candidate has finally not passed a Geospatial Techonologies- or Geoinformatics study program (only in case of the University of Münster), or

4. the candidate currently is in an examination procedure at another Higher Education Institution (only in case of the University of Münster).

§ 14   Structure, scope and mode of the Master examination

(1) The Master examination consists of the study-accompanying examinations in the following courses:

Module	Course	Type (e.g., seminar, lecture, e-learning course)	Semester hours/ week	ECTS credit points (1 CP = 30 h students' workload in Germany, 28 h in Portugal, 25 h in Spain)	Exami-nations
1. Semester (at ISEGI or UJI)					
ISEGI					
Module 1: Mathematics and Statistics (1 of 2 courses)				7,5	
	Mathematical statistics	lecture/practical	2	7,5	1
	Descriptive statistics	lecture/practical	23	7,5	1
Module 2: Data modeling (1 of 3 courses)				7,5	
	Data analysis	lecture/practical	2	7,5	1

Module	Course	Type (e.g., seminar, lecture, e-learning course)	Semester hours/ week	ECTS credit points (1 CP = 30 h students' workload in Germany, 28 h in Portugal, 25 h in Spain)	Exami-nations
	Data mining	lecture/practical	2	7,5	1
	Data bases	lecture/practical	2	7,5	1
Module 3: GI basics (2 of 4 courses)				15	
	GIS I	lecture/practical	2	7,5	1
	Remote sensing	lecture/practical	2	7,5	1
	Geostatistics	lecture/practical	2	7,5	1
	Geosoftware I	lecture/practical	2	7,5	1
				Sub-total: 30 credit points	
UJI					
Module 1: Informatics and Mathematics				12	
	Programming (data structures and Java)	lecture + practicals		4	1
	Databases (Oracle and Postgres)	lecture + practicals		4	1
	Software engineering (UML)	lecture + practicals		2	1
	Applied mathematics: logic and statistics	lecture + practicals		2	1
Module 2: New technologies				12	
	Computer graphics (OpenGL and digital terrain models)	lecture + practicals		4	1
	Multimedia (Dreamweaver and other software)	practicals		3	1
	Image processing	lecture + practicals		3	1
	Networks/Internet (wired and wireless)	lecture + practicals		2	1
Module 3: GI basics				6	
	GIS I (Idrisi and ArcView)	lecture + practicals		3	1
	Spatial analysis (point patterns and spatial stats)	lecture + practicals		2	1
	Geospatial infrastructures	e-learning		1	1
				Sub-total: 30 credit points	

2. Semester (at ifgi)					
ifgi					
Module 4: Fundamentals of Geographic Information Science				12	
	Introduction to Geographic Information Science	lecture	2	2	1
	Digital Cartography	e-Learning	2	2	1
	Digital Cartography	practical	2	3	1
	Reference Systems for Geographic Information	lecture	2	2	1
	Reference Systems for Geographic Information	practical	2	3	1
Module 5: Advanced Topics in Geographic Information Science				12	
	Selected Topics in GI	lecture/practical	2	3	1
	Seminar in GI	seminar	2	3	1
	Applications of GI within and outside geosciences	lecture/practical	3	4	1
	Geoinformatics Forum	seminar	2	2	participation
Module 6: Core competences				6	
	Research methods in GIScience	practical	2	3	1
	Project management in GI projects	practical	2	3	1
Module 7: Annual summer school or project work, performed by ifgi, ISEGI, and UJI, alternating location					
	Selected GI topics	practicals or project work		8 credit points, can be recognized for previous courses based individual permission	n of n
				Sub-total: 30 credit points	
3. Semester (at ifgi, ISEGI, or UJI)					
Thesis					
	Master thesis seminar			2	participation
	Master thesis including defense			28	1
				Sub-total: 30 credit points	
Total				Total: 90 credit points	

(2) The credit points of a courses of the first and second semester are awarded, if the required component(s) of the examination are approved and the examination is graded with an ECTS grade of „E" or better.

(3) Awarding credit points for the Master thesis and its defense will be described in § 16 and §17.

(4) If a candidate can credibly assure by a medical certification that she/he is not able to perform an examination because of long illness or disablement, the chair of the examination board or Master program coordinator has to allow the candidate to perform an equivalent examination in another way.

§ 15   Grading of examinations

(1) The examiners determine the grades of single examinations and its components. For grading, the examiners have to use one of the national grading systems, which can be transferred to ECTS grades:

ECTS Grade	Definition ECTS	University of Münster	Universidade Nova de Lisboa	Universitat Jaume I
A	EXCELLENT - outstanding perfomance with only minor errors	1,0 (A+) 1,3 (A-)	18-20 (Muito Bom, Very Good)	9-10 (sobresaliente, including matricula de honor, very rare grade)
B	VERY GOOD - above the average standard but with some errors	1,7 (B+) 2,0 (B-)	16-17 (Bom com distinção, Good with Distinction	8,0-8,99 (notable)
C	GOOD - generally sound work with a number of notable errors	2,3 (C+) 2,7 (C) 3,0 (C-)	14-15 (Bom, Good)	7,0-7,99 (notable)
D	SATISFACTORY - fair but with significant shortcomings	3,3 (D)	12-13 (Suficiente, Sufficient)	6,0-6,99 (aprobado)
E	SUFFICIENT - performance meets the minimum criteria	3,7 (E+) 4,0 (E-)	10-11 (Suficiente, Sufficient)	5,0-5,99 (aprobado)
FX	FAIL - some more work required before the credit can be awarded	5,0 (FX/F)	8-9 (Reprovado, Mediocre, Fail, Mediocre)	0,0-4,99 (suspenso)
F	FAIL - considerable further work is required	5,0 (FX/F)	0-7 (Reprovado, Mau, Fail, Bad)	0,0-4,99 (suspenso)

(2) An examination is approved with an ECTS grade of "E" or better.

(3) The overall grade of a Master examination is a weighed arithmetic average of the single modules; the grade of a module is a weighed arithmetic average of the single courses. Weighing is on the basis of the ratio of the credit points of a course examination, respectively module grade, to the overall amount of credit points of a module, respectively Master examination.

(4) Grades are weighed within the national grading systems. Grades are rounded at

    1. University of Münster: First position after the decimal point

    2. Universidade Nova de Lisboa: Not after the decimal point

    3. Universitat Jaume I: Second position after the decimal point.

(5) The overall grade of the Master examination is determined according the following table:

University of Münster	Universidade Nova de Lisboa	Universitat Jaume I	ECTS Grade	Definition ECTS
1,0 - 1,5	18-20	9-10	A	Excellent
1,6 - 2,0	16-17	8,0-8,99	B	Very Good
2,1 - 3,0	14-15	7,0-7,99	C	Good
3,1 - 3,5	12-13	6,0-6,99	D	Satisfactory
3,6 - 4,0	10-11	5,0-5,99	E	Sufficient
less than 4,0	0-9	0,0-4,99	FX/F	Fail

§ 16   Master thesis

(1) With the Master thesis, the candidate shows that she/he is capable to independently handle a defined scientific problem within a defined schedule, and in a way that is ready to publish.

(2) The editing time of a Master thesis is six months. Topic and scientific problem have to be defined in a way that it can be completed within this schedule. The thesis topic can be replaced only once within the first month. In exceptional cases, the examination board or Master program coordinator can extend the processing time.

(3) The candidate is allowed to provide suggestions for the Master thesis topic.

(4) The volume of the Master thesis is less than 60 pages. It has to be provided in English language.

(5) The Master thesis has to be provided in three original versions each to the Universidade Nova de Lisboa, University of Münster, and Universitat Jaume I.

(6) The candidate has to declare that she/he has independently composed the thesis and only used the sources and means indicated in the thesis.

§ 17   Approval and grading of the Master thesis

(1)   The Master thesis has to be provided to the chair of the responsible examination board or Master program coordinator within the deadline in nine original paper versions and a single digital file. The delivery has to be documented. In case of the Universidade Nova de Lisboa, a letter from the supervisor and co-supervisors stating that the document is resdy for discussion, has to be added.

(2)   In case of the University of Münster, not providing the Master thesis within the deadline without stringent reasons will be graded as „failed".

(3)   The Master thesis will be graded by the thesis board according to § 9-4.

(4)   The three examiners of the thesis board grade the Master thesis according to § 15 and justify grading in written form. The grade of the Master thesis is the arithmetic average of the single grades, if the single grades do not differ by more than two ECTS grades, and none or one single grade is "failed". The Master thesis is not approved, if two or three examiners grade the Master thesis with "failed", or the arithmetic average is below the ECTS grade "E" according to § 15-4 and § 15-5. If the single grades differ by more the two ECTS grades, the examination board or Master program coordinator defines a fourth examiner. In this case, the Master thesis grade is the arithmetic average of four single grades; the Master thesis is approved, if the arithmetic average is not below the ECTS grade "E" according to § 15-5.

(5)   The candidate should be informed about the Master thesis grade within 6 weeks after delivery.

(6)   The Master thesis is defended to the thesis board. In case of external members of the thesis board, the supervisors or co-supervisors can be represented by professors, assistant professors, junior professors and scientific assistants of the university, where the defense takes place, according to § 9-5.

(7)   In the Master thesis defense, the thesis board members, or representatives, interrogate the candidate for a detailed analysis of the Master thesis. The defense is up to 60 minutes. The defense is graded and documented. The examiners of the defense have to agree on a common grade. The candidate has to be informed about the grade of the defense immediately afterwards.

(8)   The "module Master thesis" is approved, if Master thesis and its defense are graded with an ECTS grade "E" or better. The grade of the "module Master thesis" is weighed by 75 % for the Master thesis and 25 % for the defense.

§ 18   Approval of the Master examination

(1)   The Master examination is approved, if all examinations according to § 14 are graded with an ECTS grade "E" or better, and 90 credit points according to § 14 are recognized.

(2)   The overall grade of the approved Master examination is calculated according to § 15.

§ 19   Repetition of the Master examination

(1)   The examinations according to § 14, except for the module "Master thesis" can be repeated twice, if they are not approved. Examination at other Higher Education Institutions have to be considered. The repetition of an approved examination is not allowed at the University of Münster.

(2)   The examination board or Master program coordinator defines the deadlines of re-examinations. Re-examinations should be repeated within six months, but not before 6 weeks after the failure.

(3)   The defense of the Master thesis according to § 14 and § 16 can only be repeated once, if not approved. If the re-examination of the defense is graded as "failed", the entire module Master thesis has to be repeated.

(4)   The Master thesis can be repeated once, if not approved. In this case, a new topic has to be defined.

(5)   For re-examination according to § 19-3 and § 19-4, the candidate may suggest new examiners and a new topic for the Master thesis and its defense.

§ 20   Master diploma

(1)   The Master diploma will be awarded at the same time by the Faculty of Geosciences, University of Münster, Instituto Superior de Estatística e Gestão de Informação, Universidade Nova de Lisboa, and Universitat Jaume I (UJI), Castellón. Each diploma will be issued in English, Portuguese, Spanish, and German.

(2)   The diploma of an approved Master examination includes:

Line 1: Portuguese Republic; Spanish Kingdom; The Federal Republic of Germany

Line 2: The administrations of the

Line 2: Universitat Jaume I; University of Münster; Universidade Nova de Lisboa

Line 3: Have jointly conferred upon

Line 4: Name of student

Line 5: The degree of Masters in Geotechnologies

Line 6: the overall grade according to the ECTS grading scale

Line 7: with all rights and privileges thereto pertaining

Line 8: Given at LOCATION the DATE

Line 9: Signatures of the three Universities

(3)   If the Master examination is not approved, the examination board or Master program coordinator provides information to the candidate about possible re-examinations and deadlines, and legal instructions. On demand, the candidate has to be provided with a certification about approved and not approved examinations and options for re-examinations.

(4)   The diploma is dated on the day of the last examination.

(5)   In addition to the diploma, the successful candidate is provided with a diploma supplement. The diploma supplement informs about the profile of the Master program, includes the overall grade, the grades of the single examinations, the topic and grades of the Master thesis and its defense, and contains a detailed description of approved examinations.

III. Final regulations

§ 21 Invalidity of the Master examination

(1) If a candidate's attempt of deception gets knows after the provision of the diploma, the examination board or Master program coordinator can declare the Master examination or single examinations invalid.

(2) If the requirements for admission to an examination were not fulfilled without a purpose of the candidate, and this fact gets known after the provision of the diploma, this fault can be compensated by a re-examination. If the candidate was approved or wrongly admitted to an examination through intentional deception, the examination board or Master program coordinator decides about the consequences.

(3) Before a decision, the candidate has to be heard.

(4) A wrongly acquired diploma has to be confiscated. A decision according to § 21-1 and § 21-2 can be made within 5 years after the date of issuing the diploma.

§ 22 Access to the examination files

(1) After the termination of the Master examination, the candidate is allowed to look at the documentations of the examinations.

(2) The application for look at the documentations of the examination has to be submitted within three months after the delivery of the diploma. The examination board chair or Master program coordinator decides about location and time of looking at the documentations.

§ 23 De-recognition of the Master degree

The Master degree can be de-recognized, if a deception or the lack of essential requirements for awarding the Master degree gets known. This requires a common decision of the legal entities of the Westfälische Wilhelms-Universität Münster, Faculty of Geosciences, Germany Universitat Jaume I, Castellón, Spain, and Universidade Nova de Lisboa, Instituto Superior de Estatística e Gestão de Informação, Lisboa, Portugal.

§ 24 Coming into force, and publication

(1) The examination regulations are coming into force on 1st of October 2007.

(2) The examination regulations will be published in the official announcements of the Westfälische Wilhelms-Universität Münster, Universitat Jaume I, and Universidade Nova de Lisboa.

Approved by the legal entities of the Westfälische Wilhelms-Universität Münster, Faculty of Geosciences, Germany, Universitat Jaume I, Castellón, Spain, and Universidade Nova de Lisboa, Instituto Superior de Estatística e Gestão de Informação, Lisboa, Portugal.

Ausgefertigt aufgrund des Fachbereichsratsbeschlusses des Fachbereichs Geowissenschaften vom 12. April 2006.

Münster, den 06. Juni 2007   Die Rektorin

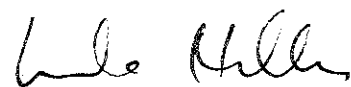   Prof. Dr. Ursula Nelles

Die vorstehende Ordnung wird gemäß der Ordnung der Westfälischen Wilhelms-Universität über die Verkündung von Ordnungen, die Veröffentlichung von Beschlüssen sowie die Bekanntmachung von Satzungen vom 08. Februar 1991 (AB Uni 91/1), geändert am 23. Dezember 1998 (AB Uni 99/4), hiermit verkündet.

Münster, den 06. Juni 2007   Die Rektorin

                                                      Prof. Dr. Ursula Nelles

Annex: Description of study program and modules

Program overview:

Module	Course	Type (e.g., seminar, lecture, e-learning course)	Semester hours/ week	ECTS credit points (1 CP = 30 h students' workload in Germany, 28 h in Portugal, 25 h in Spain)	Exami-nations
1. Semester (at ISEGI or UJI)					
ISEGI					
Module 1: Mathematics and Statistics (1 of 2 courses)		,		**7,5**	
	Mathematical statistics	lecture/practical	2	7,5	1
	Descriptive statistics	lecture/practical	2	7,5	1
Module 2: Data modeling (1 of 3 courses)				**7,5**	
	Data analysis	lecture/practical	2	7,5	1
	Data mining	lecture/practical	2	7,5	1
	Data bases	lecture/practical	2	7,5	1
Module 3: GI basics (2 of 4 courses)				**15**	
	GIS I	lecture/practical	2	7,5	1
	Remote sensing	lecture/practical	2	7,5	1
	Geostatistics	lecture/practical	2	7,5	1
	Geosoftware I	lecture/practical	2	7,5	1
				Sub-total: 30 credit points	
UJI					
Module 1: Informatics and Mathematics				**12**	
	Programming (data structures and Java)	lecture + practicals		4	1
	Databases (Oracle and Postgres)	lecture + practicals		4	1
	Software engineering (UML)	lecture + practicals		2	1
	Applied mathematics: logic and statistics	lecture + practicals		2	1
Module 2: New technologies				**12**	
	Computer graphics (OpenGL and digital terrain models)	lecture + practicals		4	1

Module	Course	Type (e.g., seminar, lecture, e-learning course)	Semester hours/ week	ECTS credit points (1 CP = 30 h students' workload in Germany, 28 h in Portugal, 25 h in Spain)	Exami-nations
	Multimedia (Dreamweaver and other software)	practicals		3	1
	Image processing	lecture + practicals		3	1
	Networks/Internet (wired and wireless)	lecture + practicals		2	1
Module 3: GI basics				6	
	GIS I (Idrisi and ArcView)	lecture + practicals		3	1
	Spatial analysis (point patterns and spatial stats)	lecture + practicals		2	1
	Geospatial infrastructures	e-learning		1	1
				Sub-total: 30 credit points	

2. Semester (at ifgi, WWU)					
ifgi					
Module 4: Fundamentals of Geographic Information Science				12	
	Introduction to Geographic Information Science	lecture	2	2	1
	Digital Cartography	e-Learning	2	2	1
	Digital Cartography	practical	2	3	1
	Reference Systems for Geographic Information	lecture	2	2	1
	Reference Systems for Geographic Information	practical	2	3	1
Module 5: Advanced Topics in Geographic Information Science				12	
	Selected Topics in GI	lecture/practical	2	3	1
	Seminar in GI	seminar	2	3	1
	Applications of GI within and outside geosciences	lecture/practical	3	4	1
	Geoinformatics Forum	seminar	2	2	participation
Module 6: Core competences				6	
	Research methods in GIScience	practical	2	3	1
	Project management in GI projects	practical	2	3	1
Module 7: Annual summer school or project work, performed by ifgi, ISEGI, and UJI, alternating location					
	Selected GI topics	practicals or project work		8 credit points, can be recognized for previous courses based individual permission	n of n
				Sub-total: 30 credit points	
3. Semester (at ifgi, ISEGI, or UJI)					
Thesis					
	Master thesis seminar			2	participation
	Master thesis including defense			28	1
				Sub-total: 30 credit points	
Total				*Total: 90 credit points*	

Module description

Module 1: Mathematics and Statistics (ISEGI)

0	Overall goals	Mediation of basic concepts needed for a structured understanding of the fundamental concepts of inferential and descriptive statistics, also needed for professional skills
1	**Educational goals and content of the module** **1.1 Courses**	7,5 of 15 credit points: Mathematical statistics (lecture and practical/2 semester hours per week/7,5 CP) Descriptive statistics (lecture and practical/2 semester hours per week/7,5 CP)
1	**1.2 Contents, sub-goals, competences**	**Contents:** The mathematical statistics course starts with the specification problem followed by the concepts of sampling and sampling distributions. Next the course deals with inferential statistics: estimation (properties and methods; confidence intervals; significance tests; and hypothesis testing. This course introduces the most relevant methods and concepts related with exploratory data analysis. Elementary concepts such as tables and graphics are explored. Measures of central tendency, dispersion, skewness and kurtosis are also studied. Concepts of correlation and regression, several index and time series are studied. **Sub-goals:** Provide the students with an adequate understanding of the major tools and concepts in classical inferential statistics and methods and concepts available in exploratory data analysis. **Mediated competences:** Methodological competences: Writing, presenting, research methods, publishing Social competences: teamwork Expertise: Understanding of mathematical and statistical concepts, its relevance in GI analysis and application context Methodological competences: writing, software handling Learning competences (key qualifications): problem solving Social competences: teamwork
1	**1.3 Integration into preparation of professional careers**	The fulfilment of the requirements of future employers for solid understanding of quantitative fields closely related with many applications of GI technology.
2	**Forms of teaching, learning, and**	Teaching and learning: Practical, Lecture

	exams	Exams: Written exams and practical exams and/or individual project
3	**Requirements for participation**	-
4	**Use of module**	International Master program, Master Program in Statistics and Information Management

5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	7,5 credit points
		Mathematical Statistics	1	7,5
		Descriptive Statistics	1	7,5
		National grading system: 20-10 pass; 9-0 Fail Can be transferred to other national grading systems and ECTS		

6	**Duration and frequency of module offer**	Each Fall semester
7	**Teachers**	Prof. Beatriz Lacomba
8	**In charge of module**	Prof. Beatriz Lacomba

Module description

Module 2: Data Modelling (ISEGI)

0	Overall goals	Provide the students with fundamental modelling and analysis skills, focused on problem solving and making use of a wide range of methods and tools available for diagnosis and prediction in a GI context.
1	**Educational goals and content of the module** **1.1 Courses**	7,5 of 22,5 credit points: Data Analysis (lecture and practical/2 semester hours per week/7,5 CP) Data Mining lecture and practical/2 semester hours per week/7,5 CP) Data Bases (lecture and practical/2 semester hours per week/7,5 CP)
1	**1.2 Contents, sub-goals, competences**	**Contents:** The objective of this module is to cover all the major themes related with data modelling and analysis. The fundamental idea is to provide the students a thorough understanding of the concepts and methods available today to tackle the growing complexity of the current data bases. At the root of this module is the concept of transforming data into information and information into knowledge, taming complexity and supporting a more efficient decision making process **Sub-goals:** This module emphasises the relations and links between GI and data modelling techniques, providing critical assessment of the special features of GI and its impact on data modelling. **Mediated competences:** Methodological competences: Writing, presenting, project planning, controlling, research methods, publishing Social competences: teamwork Expertise: Understanding the different facets of data modelling in the context of GI, problem solving capabilities and innovative approaches to complex analysis problems Methodological competences: writing, software handling Learning competences (key qualifications): problem solving Social competences: teamwork

1	**1.3 Integration into preparation of professional careers**	The fulfilment of the requirements of future employers for solid understanding of modelling and analysis tools and software handling facilitates the career chances of the graduates.		
2	**Forms of teaching, learning, and exams**	Teaching and learning: Practical, Lecture Exams: Written exams and practical exams and/or individual project		
3	**Requirements for participation**	-		
4	**Use of module**	International Master program, Master Program in Statistics and Information Management		
5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	7,5 credit points
		Data Analysis	1	7,5
		Data Mining	1	7,5
		Data Bases	1	7,5
		National grading system: 20-10 pass; 9-0 Fail Can be transferred to other national grading systems and ECTS		
6	**Duration and frequency of module offer**	Each Spring semester		
7	**Teachers**	Prof. Dr. Fernando Bação, Profª. Drª. Rosário Martins, Prof. Dr. João Garrot		
8	**In charge of module**	Prof. Dr. Fernando Bação		

Module description

Module 3: GI basics (ISEGI)

0	Overall goals	Mediation of basic concepts needed for a structured understanding of the GI field, also needed for professional skills
1	**Educational goals and content of the module** **1.1 Courses**	15 of 30 credit points: Geographic Information Systems (lecture and practical / 2 semester hours per week / 7,5 ECTS) Geosoftware I (practical / 2 semester hour per week / 7,5 CP) Remote Sensing (lecture and practical / 2 semester hours per week / 7,5 CP) Geostatistics (lecture and practical / 2 semester hours per week / 7,5 CP)
1	**1.2 Contents, sub-goals, competences**	**Contents:** The course covers the fundamental interdisciplinary concepts that are the basis of GIS development. It includes topics such as: GIS definition; relationships between GIS and other information systems; historic development; spatial representation, GIS functionality, GI accuracy, and GIS implementation, and hands-on GI software. It also covers important topics in the GI data cycle including acquiring data through remote sensing and data analysis throught geostatisics. **Sub-goals:** It emphasizes the potential of the technology and analytical methods for problem solving as well as many of the issues raised during GIS implementation. **Mediated competences:** Expertise: Understanding of GI technology, social context and functionality; apply research tools Methodological competences: writing, software handling, research methods, analytical skills Social competences: teamwork Learning competences (key qualifications): problem solving, group learning. Social competences: teamwork
1	**1.3 Integration into preparation of professional careers**	The fulfilment of the requirements of future employers for solid understanding of GI as well as software handling and analytical tools facilitates the career chances of the graduates.
2	**Forms of teaching, learning, and exams**	Teaching and learning: Practical, Lecture Exams: Written exams and practical exams and/or individual project

3	Requirements for participation	,		
4	Use of module	International Master program, Master Program in Statistics and Information Management		
5	Workload, requirements for awarding credit points, grading system	Course name	Exam	15 credit points
		Geographic Information Systems	1	7,5
		Remote Sensing	1	7,5
		Geostatistics	1	7,5
		Geosoftware	1	7,5
		National grading system: 20-10 pass; 9-0 Fail Can be transferred to other national grading systems and ECTS		
6	Duration and frequency of module offer	Each Fall semester		
7	Teachers	Prof. Dr. Marco Painho, Prof. Dr. Mário Caetano, Profª. Dr. Ana Costa and Eng Roberto Henriques		
8	In charge of module	Prof. Dr. Marco Painho		

Module description
Module 1: Informatics and Mathematics (UJI)

0	Overall goals	Provide students with those basic maths and programming skills needed to later successfully complete the Master.
1	**Educational goals and content of the module** **1.1 Courses**	• Programming (lecture and laboratory, 4 credits) • Databases (lecture and laboratory, 4 credits) • Software engineering (lecture and laboratory, 2 credits) • Applied mathematics (lecture and laboratory, 2 credits)
1	**1.2 Contents, sub-goals, competences**	**Contents:** Fundamental informatics and technical skills necessary to pass from user to analyst and developer of geospatial technologies. **Sub-goals:** Description of problems in form of algorithms and UML diagrams. Implement algorithms in a high level programming language. Design and implement relational databases. Learn fundamental mathematics for Geographic Information : linear algebra, geometry, topology, statistics **Mediated competences:** Expertise: Programming, database management and Methodological competences: Java, Oracle, Postgres. UML modelling. Statistical analysis. Learning competences (key qualifications): GI technician, programmer, customization of his/her own platform. Social competences: team building via group projects.
1	**1.3 Integration into preparation of professional careers**	Provides concrete technical competence in areas of high demand in European labour market.
2	**Forms of teaching, learning, and exams**	Mix of lecture and laboratory sessions. Exams based on lecture and graded exercises based on lab work.
3	**Requirements for participation**	None
4	**Use of module**	International Master program,
5	**Workload, requirements for awarding credit points, grading system**	<table><tr><td>Course name</td><td>Exam</td><td>12 credit points</td></tr><tr><td>Programming</td><td>1</td><td>4</td></tr><tr><td>Databases</td><td>1</td><td>4</td></tr><tr><td>Software engineering</td><td>1</td><td>2</td></tr></table>

		Applied math	1	2
		National grading system: 0 (min) -10 (max), with 5,0 being a passing grade. Can be transferred to other national grading systems and ECTS		
6	**Duration and frequency of module offer**	Offered annually during the UJI semester.		
7	**Teachers**	Mateu, Belmonte, Aramburu, Berlanga		
8	**In charge of module**	Prof. R. Berlanga		

Module description

Module 2: New technologies (UJI)

0	Overall goals	Provide background in related and supporting new technologies to GI.
1	**Educational goals and content of the module** **1.1 Courses**	- Computer graphics including terrain models (lecture and laboratory, 4 credits) - Multimedia (lecture and labs, 3 credits) - Image processing (lecture and labs. 3 credits) - Networks (lectures and labs, 2 credits)
1	**1.2 Contents, sub-goals, competences**	**Contents:** Computer graphics programming in OpenGL and applications to terrain models. Multimedia content production and reformatting. Satellite image processing. Networking fundamentals including wireless networks. **Sub-goals:** following on module 1, continued computing skills in new technology areas related to GI. **Mediated competences:** Expertise: Computer graphics and vision. Methodological competences: OpenGL programming. Creation of terrain models. Image segmentation and classification. Wired and wireless networking. Multimedia creation. Learning competences (key qualifications): problem solving Social competences: group work, work within tight guidelines and due dates
1	**1.3 Integration into preparation of professional careers**	Courses teach a series of methods in high demand across Europe.
2	**Forms of teaching, learning, and exams**	Lecture and laboratory. Exams for lecture part; exercises for laboratory part.
3	**Requirements for participation**	None
4	**Use of module**	International Master program,
5	**Workload, requirements for awarding credit points, grading system**	<table><tr><td>Course name</td><td>Exam</td><td>12 credit points</td></tr><tr><td>Computer graphics</td><td>1</td><td>4</td></tr><tr><td>Image processing</td><td>1</td><td>3</td></tr><tr><td>Multimedia</td><td>1</td><td>3</td></tr><tr><td>Networks</td><td>1</td><td>2</td></tr></table>

		National grading system: 0-10 (5=passing) Can be transferred to other national grading systems and ECTS
6	**Duration and frequency of module offer**	Annually during UJI semester.
7	**Teachers**	Belmonte, Gould, Huerta, Quirós, Pla
8	**In charge of module**	Prof. M. Gould

Module description

Module 3: GI basics (UJI)

0	Overall goals	Introduce students to GI topics in preparation for advanced topics at U. Münster.
1	**Educational goals and content of the module** **1.1 Courses**	• GIS I (lecture and laboratory, 3 credits) • Spatial analysis (lecture and laboratory, 2 credits) • Spatial Data Infrastructures (1 credit; distance learning)
1	**1.2 Contents, sub-goals, competences**	**Contents:** Basic operation of GIS software. Statistical analysis of point data. Basic components and working of SDI. **Sub-goals:** Learn fundamentals GIS concepts as implemented in various GIS software packages Lear to use point pattern analysis software in examples using social health data Use and create basic components of Spatial Data Infrastructures (SDI) **Mediated competences:** Expertise: understand working of raster and vector GIS. Analysis of point pattern data; geo statistics Methodological competences: composition and working of SDI modules. Learning competences (key qualifications): problem solving, group learning Social competences: group work (except for distance learning course)
1	**1.3 Integration into preparation of professional careers**	Provides well rounded understanding of GI topics; SDI is a key application in Information Society.
2	**Forms of teaching, learning, and exams**	Lecture, laboratories and distance learning.
3	**Requirements for participation**	N/A
4	**Use of module**	International Master program

5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	6 credit points
		GIS I	1	3
		Spatial analysis	1	2
		SDI	1	1

		National grading system: 0-10 (5=passing)
		Can be transferred to other national grading systems and ECTS
6	**Duration and frequency of module offer**	Annually during UJI semester.
7	**Teachers**	Gould, Mateu
8	**In charge of module**	Prof. M Gould

Module description

Module 4: Fundamentals of Geographic Information Science (ifgi)

0	Overall goals	Familiarize the students with the fundamental theoretical and practical notions of geographic information science and technologies.
1	**Educational goals and content of the module** **1.1 Courses**	• Introduction to Geographic Information Science (lecture, 2 semester hours, 2 CP) • Introduction to Digital Cartography (lecture and labs, 2 semester hours each, 5 CP total) • Reference Systems for Geographic Information (lecture and labs, 2 semester hours each, 5 CP total)
1	**1.2 Contents, sub-goals, competences**	**Contents:** Basic notions of geographic information, its visualization in thematic maps, and its referencing. **Sub-goals:** - understand the basic scientific and technological questions underlying geospatial technologies - learn to produce thematic maps that communicate geographic information well - understand and apply the fundamentals of spatial and semantic reference systems. **Mediated competences:** Expertise: apply GIS and related software to visualize, reference, and transform geodata. Methodological competences: master the fundamental methods of mapping geospatial information and of dealing with coordinate systems. Learning competences (key qualifications): learn to solve larger spatial analysis and presentation tasks in small groups; apply computational methods to coordinates and related geospatial data. Social competences: small team work; cope with larger computational challenges in various tools under strict time constraints.
1	**1.3 Integration into preparation of professional careers**	Producing maps in usable form, and dealing with coordinate systems is a fundamental ability of any user and designer of geospatial technologies. An understanding of basic GIScience notions is indispensable for these tasks.
2	**Forms of teaching, learning, and exams**	Interactive lectures with extensive self study and class discussions; small group (2 people) labs.
3	**Requirements for participation**	-
4	**Use of module**	International Master program
5	**Workload, requirements for awarding credit points, grading system**	Course name Exam 12 credit points Intro to GIScience yes 2 CP

		Intro to Digital Cartography	yes	5 CP
		Intro to Reference Systems	yes	5 CP
		National grading system: Can be transferred to other national grading systems and ECTS		
6	**Duration and frequency of module offer**	2 semesters, continually		
7	**Teachers**	All faculty at IfGI		
8	**In charge of module**	Prof. Kuhn		

Module description

Module 5: Advanced topics in Geographic Information Science (ifgi)

0	Overall goals	Build on the fundamental notions of module 4 to deepen understanding, knowledge, and skills in selected areas of geospatial technology applications.		
1	**Educational goals and content of the module** **1.1 Courses**	• Selected topics in GI (lecture and labs/ 2 semester hours per week/ 3 credit points) • Seminar in GI (seminar/2 semester hours per week/3 credit points) • Applications of GI (mixed/3 semester hours per week/ 4 credit points) • Geoinformatics Forum (lecture/twice 1 semester hour per week / 1 credit point each)		
1	**1.2 Contents, sub-goals, competences**	**Contents:** Specialization in topical areas selected by students from the broad range of specializations tought at Münster (interoperability, usability, visualization, cognitive engineering, space-time modelling etc.) **Sub-goals:** Depending on topics and classes chosen **Mediated competences:** Expertise: select appropriate specialization area and become involved in solving problems in it. Methodological competences: apply methods described in the scientific and standards literature. Learning competences (key qualifications): self-motivated acquisition of essential methodological knowledge and skills in self-selected areas. Social competences: rapid knowledge acquisition, succinct oral presentations, written reports, team work depending on classes.		
1	**1.3 Integration into preparation of professional careers**	Essential topical knowledge for applying GI in any professional field; necessarily limited in breadth.		
2	**Forms of teaching, learning, and exams**	Mixed, depending on classes chosen.		
3	**Requirements for participation**	Module 4 successfully completed or ongoing.		
4	**Use of module**	International Master program		
5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	12 credit points
		Selected Topics in GI	1	3
		Seminar in GI	1	3

		Application of GI	1	4
		Geoinformatics Forum	1	2
		National grading system: 1 (very good) – 4 (sufficienct), and failed Can be transferred to other national grading systems and ECTS		
6	**Duration and frequency of module offer**	Continual and broad choice of course offerings		
7	**Teachers**	All faculty at IfGI		
8	**In charge of module**	Prof. Kuhn		

Module description

Module 6: Core competences

0	Overall goals	Mediation of soft skills needed in professional GI careers
1	**Educational goals and content of the module** **1.1 Courses**	- Project management in GI projects (practical/2 semester hours per week/3 credit points) - Research methods in GI Science (practical/2 semester hours per week/3 credit points)
1	**1.2 Contents, sub-goals, competences**	**Contents:** The following aspects of project management are mediated: Project acquisition, project planning, budgeting, controlling, documentation, evaluation. Emphasis lies on the practical execution of a GI project, where students working groups are responsible for different project phases. Mediated research methods are tools of scientific research, scientific writing, presenting, and publishing. **Sub-goals:** Sub-goals are the mediation of competencies in project management and research methods. These key competencies are required for GI professionals in private companies as well as in research institutions. Thus, essential qualifications are mediated for a successful career start. **Mediated competences:** Expertise: Project management, research tools Methodological competences: Writing, presenting, project planning, controlling, budgeting, research methods, publishing Learning competences: self-learning, group learning, problem solving Social competences: teamwork
1	**1.3 Integration into preparation of professional careers**	The fulfillment of the requirements of future employers for soft skills facilitates the career chances of the graduates.
2	**Forms of teaching, learning, and exams**	Teaching and learning: Practical, group work Exams: Presentations and written elaborations
3	**Requirements for participation**	-
4	**Use of module**	International Master program

5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	6 credit points
		Research methods in GI Science	1	3

		Project management in GI projects	1	3
		National grading system: 1 (very good) – 4 (sufficienct), and failed		
		Can be transferred to other national grading systems and ECTS		
6	Duration and frequency of module offer	Each summer semester		
7	Teachers	Dr. Brox, Prof. Dr. Raubal, N.N.		
8	In charge of module	Dr. Brox		

Module description
Module 7: Summer School (optional, ifgi, ISEGI, UJI)

0	Overall goals	Mediating GI contents in a multicultural environment of international students, and teachers with different GI backgrounds
1	Educational goals and content of the module 1.1 Courses	Depending on event, to be recognized as courses of modules 1-6 Options for execution are the Vespucci Summer School (www.vespucci.org), and joint or single events, e.g., the ifgi Fall School 2004, see http://ifgi.uni-muenster.de).
1	1.2 Contents, sub-goals, competences	
1	1.3 Integration into preparation of professional careers	
2	Forms of teaching, learning, and exams	
3	Requirements for participation	
4	Use of module	International Master program, national programs of partners
5	Workload, requirements for awarding credit points, grading system	Course name	Exam	Xx credit points

Course name	Exam	Xx credit points

	National grading system: dependent on location
	Can be transferred to other national grading systems and ECTS
6	Duration and frequency of module offer	Optional
7	Teachers	

8	In charge of module	Prof. Gould, Prof. Kuhn, Prof. Painho

Module description

Master thesis (ifgi, ISEGI, UJI)

0	Overall goals	Independent work on a GI topic using scientific methods and presentation of results
1	**Educational goals and content of the module** **1.1 Courses**	• Master thesis including its defense (30 CP)
1	**1.2 Contents, sub-goals, competences**	**Contents:** Depending on topic **Sub-goals:** Depending on topic **Mediated competences:** Expertise: Basic research questions and research methods in GI Methodological competences: Solving GI problems (dependent on topic) Learning competences: Scientific writing, independent working, literature review Social competences: Communication with supervisor and co-researchers
1	**1.3 Integration into preparation of professional careers**	Treating a GI topic / Solving a GI problem within a defined schedule and quality
2	**Forms of teaching, learning, and exams**	Teaching and learning: Literature and Internet review, others dependent on topic Exam: Master thesis including its defense
3	**Requirements for participation**	Recognition of 60 credit points of this Master program
4	**Use of module**	International Master program

5	**Workload, requirements for awarding credit points, grading system**	Course name	Exam	30 credit points
		-	thesis	30

National grading system:
Can be transferred to other national grading systems and ECTS

6	**Duration and frequency of module offer**	ongoing
7	**Teachers**	Prof. Gould, Prof. Kuhn, Prof. Painho, N.N.
8	**In charge of module**	Prof. Gould, Prof. Kuhn, Prof. Painho