

UNIVERSITY OF AMSTERDAM

FACULTY OF SCIENCE

EDUCATION AND EXAMINATION REGULATIONS

PART B

Academic year 2013-2014

MASTER'S PROGRAMME BIOMEDICAL SCIENCES

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Chapter 1. General Provisions

Article 1.1 – General Provisions

This document consists of two parts: Part A and Part B. Part A includes general information that applies to all the Master's programmes on offer. Part B deals with specific aspects of the individual Master's programme Biomedical Sciences. These Master's programmes are offered by the Faculty of Science (Faculteit der Natuurwetenschappen, Wiskunde & Informatica, FNWI), hereinafter referred to as: the Faculty

Article 1.2 – Definitions

In addition to part A, the following definitions are used in part B

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|----------------------------|--|
| a. Course | Education imparted in a series of lessons or meetings |
| b. Literature Review | A component of 12 ECTS credits comprising research into the literature resulting in a written report |
| c. Personal Education Plan | An individual study plan for the student's master programme. |
| d. Research Project | Compulsory internship/master thesis of 30-60 ECTS credits always resulting in a written report |

Chapter 2. Content and Organisation of the Programme

Article 2.1 – Aim of the programme and exit qualifications

1. After completing the study programme the student is able to successfully fulfil a position in society requiring an academic qualification. In particular, the student is able to hold a position requiring or desiring a biomedical degree after completion of advanced training. In addition to the emphasis on learning to conduct empirical research, the study programme provides a good knowledge base and attitude towards a medical biological approach to relevant social issues.
2. After completing the Master's programme the graduate has acquired the following qualities:
 - analysing, problem-solving and synthesising competences at the required academic level;
 - both a broad and basic medical biological as well as specialist knowledge of one or more sub-areas of biomedical sciences;
 - a series of practical biomedical skills and academic skills such as oral and written presentations in English and computer knowledge to function adequately at an academic level;
 - the ability to independently set up and implement biomedical experiments contributing to a line of research;
 - the ability to get acquainted with a field of research in a short period of time by self study, to form an independent opinion and to write a critical essay in a set period of time;
 - the ability to think at various organisational levels of medical biology and to involve the relationship with other fields of research;
 - an attitude that enables critical self-reflection.
3. After completing the master's programme Biomedical Sciences the graduate should have acquired the following qualities in the fields of knowledge, and understanding and skills:

Knowledge and Understanding

The graduate :

- is able to read up on and master current scientific research developments;
- has knowledge of current scientific research.

Skills

The graduate is able to:

- formulate questions at the frontline of scientific research;
- formulate a realistic and falsifiable (research) hypothesis, based on incomplete or limited information and translate this into a research proposal
- independently carry out experiments and laboratory measurements;
- analyse biomedical patterns and processes in both the qualitative and quantitative sense;
- to present the findings at various scales and levels of abstraction.

4. Within the programme the following tracks are offered:

Medical Biology Cluster

- Biochemistry and Metabolic Diseases;
- Cell Biology and Advanced Microscopy ;
- Experimental Internal Medicine;
- Infection and Immunity;
- Oncology.

Neurobiology Cluster

- Basic and Applied Neuroscience;
- Cognitive Neurobiology and Clinical Neurophysiology;
- Molecular Neuroscience;
- Psychopharmacology and Pathophysiology.

5. In addition to paragraph 2 and 3, the student finishing the track Biochemistry and Metabolic Diseases:

- has obtained the ability to interpret and evaluate current state-of-the-art research in the fields of biochemistry and metabolic diseases and to start an independent research project in this direction;
- Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of biochemical processes is required.

6. In addition to paragraph 2 and 3, the student finishing the track Cell Biology and Advanced Microscopy:

- has obtained the ability to interpret and evaluate current state-of-the-art research in the fields of cell biology and microscopy and to start an independent research project in this direction;
- Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of cell biological processes and visualise these processes through microscopy is required.

7. In addition to paragraph 2 and 3, the student finishing the track Experimental Internal Medicine:

- has obtained the ability to interpret and evaluate current state-of-the-art research in the field of experimental internal medicine and to start an independent research project in this direction;
- Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of endocrinological and cardiovascular processes is required.

8. In addition to paragraph 2 and 3, the student finishing the track Infection and Immunity:

- has obtained the ability to interpret and evaluate current state-of-the-art research in the fields of infection and immunity and to start an independent research project in this direction;
 - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of infectious and immunological processes is required.
9. In addition to paragraph 2 and 3, the student finishing the track Oncology:
- has obtained the ability to interpret and evaluate current state-of-the-art research in the fields of oncology and to start an independent research project in this direction;
 - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of oncological processes is required.
10. In addition to paragraph 2 and 3, the student finishing the track Basic and Applied Neuroscience:
- has obtained a solid knowledge of the basic disciplines that together form Neuroscience with a focus on the cellular and system level: neurophysiology, anatomy, neurogenetics and molecular neuroscience;
 - has learned how to employ his/her fundamental scientific knowledge in translational neuroscience.
11. In addition to paragraph 2 and 3, the student finishing the track Cognitive Neurobiology and Clinical Neurophysiology:
- has obtained a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on the neural mechanisms underlying behavior and cognition;
 - has obtained the ability to interpret and evaluate current state-of-the-art research on clinical neurophysiology, in particular on the field of brain imaging and neurophysiology of neuropsychiatric disorders
12. In addition to paragraph 2 and 3, the student finishing the track Molecular Neuroscience:
- has obtained a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on the molecular biology of neuronal systems, midbrain and cortex development and signal transduction;
 - has learned to apply for research funding.
13. In addition to paragraph 2 and 3, the student finishing the track Psychopharmacology and Pathophysiology:
- has obtained a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on putative neuronal substrates, mechanisms of action and deficits underlying the most important and/or common neuropsychiatric and neurological disorders.
 - has performed an internship where he/she obtained a deeper understanding of, and at least some practical experience with, some of the most commonly used research tools, models and approaches and analytical methods to study the potential substrates, behavioral responses and disease mechanisms implicated in these brain disorders.

Article 2.2 – Organisation of the programme

This programme is offered on a full-time basis.

Article 2.3 – Language of instruction for the programme

The language of instruction for the programme is English. This means that the Code of Conduct for Foreign Languages at the UvA2000 and the provisions laid down in Section 7.2 of the Act apply (see appendix 3 of part A).

Article 2.4 – Scope of the programme

The programme has a workload of 120 ECTS credits and concludes with a final examination. One ECTS credit equals 28 hours of study activities.

Article 2.5 – Curriculum

1. In each programme the student may choose one out of three majors or a minor (see Article 2.10).
 - Major Science Communication
 - Major Science in Society
 - Major Teaching
 - Minor Tesla
2. Students have to consult the track coordinator for the contents of their individual study programme by filling in their Personal Education Plan (PEP). A standard PEP contains courses offered by the master's programme (see attachment 1), research projects and literature review. Any change in the standard PEP have to be approved by the track coordinator. An alternative PEP containing courses not offered by the master's programme has to be submitted to the track coordinator and the Examinations Board for prior approval (see also Article 2.11 of these Regulations). Students and track coordinators are advised to consider the requirements for the majors (60 ECTS credits) and minor (30 ECTS credits) when filling in the PEP (see also Article 2.5.3 and Article 2.10 of these Regulations).
3. The curriculum comprises the following:

Biochemistry & Metabolic Diseases	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Molecular Biology of the Cell</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Biomedical Systems Biology</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Medical Biochemistry</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
Elective Courses (see attachment 1)	0-18 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	72-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Cell Biology and Advanced Microscopy	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Molecular Biology of the Cell</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Advanced Microscopy</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Clinical Cell Biology</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
Elective Courses (see attachment 1)	0-18 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	72-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Experimental Internal Medicine	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Molecular Biology of the Cell</i>	6 ECTS credits	6 ECTS credits
<i>Cardiovascular Diseases</i>	6 ECTS credits	6 ECTS credits
<i>Endocrinology</i>	6 ECTS credits	6 ECTS credits
Elective Courses (see attachment 1)	0-18 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	72-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Infection and Immunity	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Molecular Biology of the Cell</i>	6 ECTS credits	6 ECTS credits
<i>Advanced Immunology</i>	6 ECTS credits	6 ECTS credits
<i>Advanced Medical Microbiology</i>	6 ECTS credits	6 ECTS credits
Elective Courses (see attachment 1)	0-12 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	78-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Oncology	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Molecular Biology of the Cell</i>	6 ECTS credits	6 ECTS credits
<i>Experimental Oncology</i>	6 ECTS credits	6 ECTS credits
<i>Clinical Cell Biology</i>	6 ECTS credits	6 ECTS credits
Elective Courses (see attachment 1)	0-12 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	78-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Basic and Applied Neuroscience	Regular Curriculum	Major
Compulsory Courses	12 ECTS credits	12 ECTS credits
<i>Advanced Neuroscience</i>	12 ECTS credits	12 ECTS credits
Elective Courses (see attachment 1)	0-18 ECTS credits	6 ECTS credits
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	78-96 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Cognitive Neurobiology and Clinical Neurophysiology	Regular Curriculum	Major
Compulsory Courses	12 ECTS credits	12 ECTS credits
<i>Advanced Cognitive Neurobiology and Clinical Neurophysiology</i>	12 ECTS credits	12 ECTS credits
Elective Courses (see attachment 1)	0-18 ECTS credits	6 ECTS credits
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	78-96 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Molecular Neuroscience	Regular Curriculum	Major
Compulsory Courses	18 ECTS credits	18 ECTS credits
<i>Neurodevelopment: Specification of neuronal systems</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Neuronal Signaling Transduction Pathways</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
<i>Stem Cell Fate and Cortical Genesis</i>	<i>6 ECTS credits</i>	<i>6 ECTS credits</i>
Elective Courses (see attachment 1)	0-18 ECTS credits	-
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	72-90 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

Psychopharmacology and Pathophysiology	Regular Curriculum	Major
Compulsory Courses	12 ECTS credits	12 ECTS credits
<i>Advanced Psychopathology</i>	<i>12 ECTS credits</i>	<i>12 ECTS credits</i>
Elective Courses (see attachment 1)	0-18 ECTS credits	6 ECTS credits
Literature Review	12 ECTS credits	12 ECTS credits
Research Projects*	78-96 ECTS credits	30 ECTS credits
Major**	-	60 ECTS credits
Total Study Load	120 ECTS credits	120 ECTS credits

*For the research/regular programme: two research projects with a minimum of 30 ECTS credits and a maximum of 60 ECTS credits,

*** For the major Science Communication, major Science in Society and major Teaching: one research project of 30 ECTS credits

a. General compulsory course components

In the UvA Course Catalogue the content, format and examination requirements of each compulsory component of the study programme are described, indicating the preconditions that are required, in order to be able to follow the course successfully.

b. Elective courses

Elective courses may be part of the study programme. In the UvA Course Catalogue the content, format and examination requirements of elective courses are described. A list of courses provided by the master's programme can be found in Attachment 1.

Article 2.6 – Course components completed elsewhere

Exemptions for components successfully completed at a higher education institution prior to beginning the Master's programme may only be granted on the basis of Article 3.9 of Part A of these Regulations.

Article 2.7 – Free curriculum

1. Subject to certain conditions, the student has the option of compiling a curriculum of his/her own choice which deviated from the curricula mentioned in Article 2.5 of these Regulations. The concrete details of such a curriculum require permission of the relevant Examinations Board.
2. In order to be considered for a diploma of this programme, at least one half of the proposed curriculum has to consist of components of the study programme.

Article 2.8 – Admission to the Master's programme

1. A student, who has obtained a Bachelor's degree in Biomedical Sciences from a Dutch University or a Bachelor's degree in Psychobiology from the University of Amsterdam may enter the programme.

2. In addition to the requirements stated in paragraph 1, the student has to comply with the additional entry requirements depending on the cluster to be followed, which are described in paragraphs 3 and 4
3. In addition to the requirements stated in paragraph 1, to enrol in the Medical Biology Cluster advanced (2nd and 3rd year BSc level) knowledge in molecular and cellular biology is required. An intake interview may be part of the intake procedure.
4. In addition to the requirements stated in paragraph 1, to enrol in the Neurobiology Cluster advanced (2nd and 3rd year BSc level) knowledge in neurobiology is required. An intake interview may be part of the intake procedure.
5. In addition to the requirements stated in paragraph 1, to enrol in the track Infection and Immunity advanced (2nd and 3rd year BSc level) knowledge in immunology is required. An intake interview may be part of the intake procedure.
6. Without prejudice to the provisions of paragraphs 1 through 5 the Examinations Board may, after asking advice of the programme director, grant admission to a student whose academic Bachelor does not meet aforementioned entrance requirements. An interview may be part of the intake procedure.

Article 2.9 – Enrolment

The programme starts at the beginning of the first semester of the study year (September)

Article 2.10 – Majors/Minor

1. The student can choose between one of three majors or one minor, provided that they are offered within the specific programme. The majors and minor are:
 - a. Major Science Communication
 - b. Major Science in Society
 - c. Major Teaching
 - d. Minor Tesla
2. Regarding the major Science Communication:

The major in Science Communication consists of 60 ECTS credits. It has to be combined with a research programme, comprising at least 60 ECTS credits (courses, research project and literature review), and with the general compulsory components in order to meet the general requirements of the programme. The exit qualifications of this major can be found as an appendix to Part B of these Regulations. Further information on this major can be found on the website of the VU University Amsterdam.
3. Regarding the major Science in Society:

The major in Science in Society consists of 60 ECTS credits. It has to be combined with a research programme, comprising at least 60 ECTS credits (courses, research project and literature review), and with the general compulsory components in order to meet the general requirements of the programme. The exit qualifications of this major can be found as an appendix to Part B of these Regulations. Further information on this major can be found on the website of VU University Amsterdam.
4. Regarding the major Teaching:

The major Teaching consists of 60 ECTS credits. It must be combined with a research programme, comprising at least 60 ECTS credits (courses, internship and literature study), and with the general compulsory components in order to meet the general requirements of the programme. Students who have completed an Educatieve Minor of 30 ECTS credits during their Bachelor's programme may submit a non-standard study programme for approval to the Examinations Board, after discussing this non-standard study programme

with the coordinator of the major Teaching and the coordinator of the Master's programme. The exit qualifications of this major can be found as an appendix to Part B of these Regulations. Further information on this major can be found on the website of the Interfacultaire Lerarenopleidingen (ILO) of the University of Amsterdam.

5. Regarding the minor Tesla:

The minor Tesla consists of 30 ECTS credits. It must be combined with a research programme, comprising at least 90 ECTS credits (courses, research project and literature study), and with the general compulsory components in order to meet the general requirements of the programme. The minor consists of a course component and a project-based component. This project-based component has to be supervised by a Faculty examiner and is subject to prior approval of the Examinations Board. Because it is a multidisciplinary minor an examiner from the research programme has to be appointed as a second assessor. The learning objectives of this minor can be found as an appendix to Part B of these Regulations. Further information on this minor can be found on the websites of the Graduate School of Science and the Graduate School of Life and Earth Sciences.

6. Students have to go through a separate intake procedure for admission to the major in Science in Society, major in Science Communication, major Teaching and minor Tesla.
7. Students first have to finish the obligatory research part of the programme (60 ECTS) before starting one of the majors or the minor.
8. It is not permitted to take the obligatory research part of the programme and the major or minor simultaneously

Article 2.11 – Double Master's programme (two-year programmes)

In order to be awarded two Master's degrees or to have stated on the Master's diploma that two Master's programmes have been completed within the discipline, the following requirements must be met:

1. The total programme of the candidate should amount to at least 180 ECTS credits.
2. The candidate's work for the programme (lectures, research work, etc.), must be of such a standard that all the compulsory requirements of each of the two programmes have been met.
3. The candidate must have conducted separate research work for both Master's degrees. This may consist of two separate research projects with supervisors from the respective study programmes. In the case of an integrated research project, this must be supervised by two staff members appointed from the two study programmes. Both staff members must assess the work as a pass.
4. The Examinations Boards of both study programmes must approve the student's double Master's programme before the student commences on the double Master's programme.

Article 2.12 – Elective components

1. Course components successfully completed elsewhere or that are not included in attachment 1 during the programme may supplement the student's examination programme, subject to prior permission from the Examinations Board.
 - a. The courses have to be followed at an accredited university or institute
 - b. The course has to be relevant to the master chosen
2. In terms of content, elective components must not show too much similarity to the components of the student's standard curriculum. The acceptable degree of similarity will be decided by the Examinations Board.
3. An elective component will only be seen as part of the programme if the Examinations Board has given its prior approval.

Chapter 3. Teaching

Article 3.1 – Participation in courses and rules for priority admission

1. Every student must enrol for every course component. To participate in courses, the student must enrol within the period indicated in the UvA Course Catalogue and according to procedures mentioned there. The student may be refused the opportunity to participate if he/she does not enrol or fails to enrol in time.
2. Admission to courses with limited capacity takes place based on previously established and published admission criteria and rules for priority admission, on the understanding that students enrolled in the programme are given priority over others when enrolling for courses in the compulsory part of their programme.
3. Persons who are not enrolled at the University have no right to participate in teaching and examinations.

Article 3.2 – Sequence and admission requirements

1. The student may only participate in interim or other examinations or practical exercises of the course components mentioned below if he/she has passed the interim or other examination components:
 - The student has to successfully complete at least 6 ECTS credits of obligatory courses prior to approval and starting of the research project.
2. In cases where the result of a component has not been determined within the time periods mentioned in Article 3.6 of part A, this component may not be required as prior knowledge for the subsequent component.

Article 3.3 – Research Projects and Literature Review

1. The student has to submit a proposal for each research project and literature review for prior approval to the track coordinator.
2. The research projects and literature review have to be completed and assessed within the period indicated in the approval form signed by the track coordinator. Research projects and the literature review have to be assessed by at least two assessors.
3. At the end of the research project and its final report, the responsible FNWI examiner checks on the basis of an assessment form if the student has sufficiently achieved the set exit qualifications.
4. The assessor and second FNWI examiner assess the quality of the research project and the literature review. The final mark is determined by the FNWI examiner after consultation with the assessor.
5. Further information on regulations and procedures about Research Projects and Literature Review can be found in the UvA Course Catalogue.

Article 3.4 – Determining results of examinations

In addition to Article 3.6 subsection 2 and 3 of Part A, in case the examination of a component consists of two or more parts, each part has to be graded with a 5.0 or higher to pass the examination.

Article 3.5 – Minimum and maximum number of participants

1. In case there is a maximum capacity for courses, this is indicated in the Course Catalogue.
2. When less than eight participants have registered for a course, the programme director may cancel the course. This has to be announced to the participant at least two weeks prior to the start of this course. When courses are cancelled, registration of the student for another course will be enabled.

Chapter 4. Transitional and final provisions

Article 4.1 – Amendments

1. The dean shall establish amendments to the part B of these Regulations by independent decision – having heard the programme committee and with due regard for the authority of the relevant advisory bodies
2. Amendments to the part B of these Regulations do not apply to the current academic year unless they can be reasonably assumed not to damage the student's interest.

Article 4.2 – Effective date

Part B of these Regulations shall come into force as of 1 September 2013.

Thus drawn up by the Dean of the Faculty of Science on 2 July 2013.

Attachment 1**List of courses provided by the study programme.**

Course	Study Load (ECTS credits)	Period	Type of Test	Practical Exercise
Advanced Cognitive Neurobiology and Clinical Neurophysiology	12	1	Written and oral	Yes
Advanced Immunology	6	1	Written and oral	No
Advanced Medical Microbiology	6	2	Written and oral	No
Advanced Microscopy	6	1	Written	Yes
Advanced Neuroscience	12	1	Written and oral	Yes
Advanced Psychopathology	12	1	Written and oral	Yes
Biomedical Systems Biology	6	1	Written and oral	Yes
Capita Selecta from Basic and Applied Neuroscience	12	2	Written and oral	Yes
Cardiovascular Diseases	6	1	Written	No
Clinical Cell Biology	6	2	Written and oral	No
Early Life related Vulnerability to Adult Onset Disorders; epigenetics	6	3	Written and oral	No
Endocrinology	6	2	Written and oral	No
Experimental Neurobiology of Disease	12	2	Written	Yes
Experimental Oncology	6	1 & 4	Written	Yes
Medical Biochemistry	6	2	Written	No
Molecular Biology of the Cell	6	1	Written	Yes
Molecular Structure in Biology	6	1	Written	Yes
Network Models: from Neuroscience to Cognition	6	3	Written and oral	Yes
Neurodevelopment: Specification of Neuronal Systems	6	1	Written	Yes
Neuronal Signaling Transduction Pathways	6	2	Written	Yes
Special Topics and Analysis of Neural Data	12	2	Written	Yes
Stem Cell Fate and Cortical Genesis	6	1	Written	Yes

Appendix: Final attainment levels of the major Science in Society (SS), the major Science Communication (SC) and Major Teaching, and learning objectives minor TESLA

A. Final attainment levels of the major Science in Society (SS)

The final attainment levels of the major with regard to the Dublin descriptors are given below.

Dublin descriptor 1: Knowledge and understanding

The graduate has theoretical and practical knowledge of management, policy analysis and entrepreneurship

The graduate:

- a. has insight into the various relevant disciplines in the social and behavioural sciences. More specifically, the student acquires insight into:
 - o important concepts and theories in the field of policy science, management studies, and entrepreneurship;
 - o the relation of these gamma sciences to the beta sciences;
- b. has insight into concepts and the latest theories, research methodologies, analytical models and important research questions related to interdisciplinary research for addressing societal problems;
- c. has knowledge of, and insight into, relevant concepts and theories for effective communication and collaboration;

Dublin descriptor 2: Applying knowledge and understanding

The graduate is experienced in carrying out interdisciplinary research, in applying techniques specific to the subject area and in applying scientific knowledge to societal problems.

The graduate:

- a. has the ability to integrate knowledge from the beta and gamma sciences, as well as from science and practice;
- b. can apply scientific knowledge to formulate solutions to societal problems and assess them for appropriateness and societal relevance;
- c. adopts an appropriate attitude towards the correct and unbiased use and presentation of data.

Dublin descriptor 3: Making judgements

The graduate is able to independently and critically judge information.

The graduate is able to:

- a. independently acquire information in relevant scientific areas through a literature review and by conducting empirical research, as well as evaluate such information critically;
- b. select and order information, distinguish essentials from trivialities, and recognize connections;
- c. formulate personal learning objectives and critically evaluate own performance, both introspectively and in discussion with others.

Dublin descriptor 4: Communication

The graduate is able to transfer knowledge and skills related to his/her subject area to other people and to adequately reply to questions and problems posed within society.

The graduate:

- a. has acquired skills to report orally and in writing on research results in English;
- b. has the ability to communicate research conclusions, and the knowledge and rationale underpinning them, to specialist audiences and non-specialist audiences clearly and unambiguously;

- c. can collaborate with researchers from various scientific disciplines;
- d. can make essential contributions to scientific discussions about plans, results and consequences of research.

Dublin descriptor 5: Learning skills

The graduate has developed learning skills that enable him/her to continue with self-education and development within the subject area.

The graduate:

- a. has acquired skills to develop a research plan, giving details of the problem statement, objectives, research questions, research approach, research methods, and planning;
- b. is familiar with the general scientific journals, such as Nature and Science, and with journals in the specialisation, such as Research Policy, Health Policy, Science, Technology & Human Values, Social Science & Medicine, and International Journal on Technology Management;
- c. has the learning skills to allow him/her to continue to study in a manner that may be largely self-directed or autonomous (life-long learning).

B. Final attainment levels of the major Science Communication (SC)

The MSc graduate possesses an academic attitude, skills and competences to operate at the interface of science and society aiming to contribute to a fruitful science-society dialogue. This means that Master's graduates have the following focus:

- Understanding the dynamic relationship between science and society
- Translating information from the natural sciences to society and vice versa
- Shaping the dialogue between science and society

Knowledge

- Knowledge of and insight into the relevant concepts and theories in the field of science communication, sociology, communication science, philosophy and science & technology studies in relation to the natural sciences
- Familiarity with scientific journals in the field of science communication and science & technology studies, as well as familiarity with a variety of popular-scientific media
- Insight into the nature and course of interpersonal and group communication processes relevant to the formal and informal dialogue between science and society
- Insight into relevant concepts and theories for effective communication and collaboration in relation to diverse science-society interactions
- Insight into the popularization of the natural sciences in various media
- Insight into the roles and responsibilities of museums in science communication

Skills

- Independently acquire, analyze and evaluate relevant information in a variety of scientific disciplines, by conducting literature study and empirical research
- Communicate and collaborate effectively with diverse professionals of scientific and nonscientific disciplines as well as lay citizens
- Design and facilitate interactive processes in relation to the science-society dialogue
- Translate information from various natural science disciplines into more generally accessible language and formats
- Produce popular-scientific media output concerning developments in the natural sciences, aimed at a variety of publics

- Contribute to the design of museum exhibitions from the perspective of scientific content management and science communication theory
- Make an intrinsic contribution to the societal discussion of developments in science and technology

C. Final attainment levels of the major Teaching

Aan het eind van de opleiding moet de student beschikken over de kwaliteiten ofwel competenties op het gebied van geïntegreerde kennis, inzicht en vaardigheden behorend bij het beroep van leraar in het eerstegraads gebied van het voortgezet onderwijs. De competenties hebben betrekking op de taakgebieden waarvoor wordt opgeleid: onderwijzen, begeleiden, organiseren, ontwikkelen en onderzoeken, en professionaliseren. De competenties zijn de volgende.

- *Interpersoonlijk competent*

Je bent interpersoonlijk competent als je in het contact met leerlingen (en ook met anderen) kunt leiden, begeleiden, bemiddelen, stimuleren en confronteren. Daarmee bereik je een klimaat met open communicatie en een sfeer van samenwerking en wederzijds vertrouwen.

- *Pedagogisch competent*

Je bent pedagogisch competent als je benaderingen kunt ontwerpen, uitvoeren en evalueren om het welbevinden van leerlingen te bevorderen, om ontwikkelings- en gedragsproblemen te signaleren en om groepen en individuen te begeleiden. Daarmee bereik je een veilige leeromgeving waarin leerlingen zich kunnen ontwikkelen tot zelfstandige en verantwoordelijke personen.

- *Vakinhoudelijk en didactisch competent*

Je bent vakinhoudelijk en vakdidactisch competent als je je eigen vak gedegen beheerst, op basis daarvan aantrekkelijke, effectieve en efficiënte leeractiviteiten kunt ontwerpen, uitvoeren, begeleiden en evalueren. Daarmee bereik je een krachtige leeromgeving voor leerlingen.

- *Organisatorisch competent*

Je bent organisatorisch competent als je concrete en functionele procedures en afspraken kunt hanteren en als je de leeromgeving en het leren van leerlingen kunt organiseren en faciliteren en de planning kunt bewaken en bijstellen. Daarmee bereik je een overzichtelijke, ordelijke en taakgerichte leeromgeving.

- *Competent in het samenwerken met collega's*

Je bent competent in het samenwerken met collega's als je informatie deelt, actief bijdraagt aan overleg en samenwerkingsverbanden en deelneemt aan collegiale consultatie. Daarmee bevordert je een collegiale en harmonieuze werksfeer.

- *Competent in het samenwerken met de omgeving*

Je bent competent in het samenwerken met de omgeving als je doelmatige contacten onderhoudt met ouders (verzorgers), maar ook met andere mensen en instanties die te maken hebben met de zorg voor en de opleiding van leerlingen. Daarmee bereik je dat de ontwikkeling van leerlingen op een realistische en constructieve manier wordt ondersteund en dat eventuele problemen tijdig worden onderkend en opgelost.

- *Competent in reflectie en onderzoek ten dienste van ontwikkeling*

Je bent competent in reflectie als je je handelen planmatig kunt bijstellen op grond van ervaringen in beroepssituaties. Daarmee bereik je professioneel leren en ontwikkeling van jezelf.

Je bent competent in onderzoek als je de beroepspraktijk in het algemeen en je eigen beroepspraktijk in het bijzonder kunt analyseren met distantie en met onderzoeksmatige deskundigheid. Daarmee bereik je ontwikkeling van je school, van de didactiek van je vak en/of van jezelf.

D. Learning Objectives Tesla

Main Objective

To offer ambitious science students with a demonstrated excellent Academic and non-Academic track record the opportunity to engage in a final challenge before finishing their research master programme.

On completing the Tesla Programme the graduate has acquired the qualities to bridge Science, Society and Business within complex research and project challenges related to the own scientific background. The graduate is fit to start a career in demanding environments which require abilities to utilize the disciplinary science background (as described in OER B) in work environments within or outside of science.

These qualities will be developed while 1) working on an interdisciplinary project related to the scientific background of the graduate and 2) undergoing intensive training on a range of skills.

General Objectives

The graduate has:

1. The analyzing, problem-solving and synthesizing abilities in order to be able to function at the required academic level
2. The abilities to utilize his or her specific scientific background (as specified in the OER B of the Master Programme in which the student is enrolled) in settings on the interface of science, business and society
3. A series of practical professional, academic and personal skills which result in the ability to
 - a. independently set up, manage and execute an interdisciplinary projects at the interface of science, business and society. Thereby utilizing scientific knowledge in contributing to a real demand of a knowledge intensive organization
 - b. get acquainted with a field of study in a short period of time by self-study, to form one's own opinion and to communicate critically and effectively with different audiences on the topic
 - c. deal with complex challenges and gather and structure information on different levels to enable professional action in different fields and especially the ability to utilize his/her own scientific background in a non-Academic environment
 - d. Communicate effectively with different stakeholders (e.g. business professionals, policymakers) while using appropriate means (e.g. business plans, policy advice).
 - e. operate effectively in interdisciplinary teams.
4. An attitude that enables the student to critically reflect on his/her own actions

In doing so the graduate should have acquired the following qualities in the fields of 'Professional Knowledge & Insight' and 'Professional Skills':

Professional Knowledge and Insight

Students should develop professional knowledge and insight regarding bringing “science to value in practice”, especially in relation to their scientific background. More specifically, students should:

- a. Obtain understanding of different business practices, discourses and settings with regard to bringing scientific knowledge to value.
- b. Develop knowledge on scientific developments in relevant disciplines related to dealing with the societal challenges of 21st century.
- c. Obtain understanding of different non-profit practices and settings with regard to bringing scientific knowledge to value
- d. Obtain understanding of different governmental practices and settings with regard to bringing scientific knowledge to value.
- e. Increase knowledge and insight of possible career paths and possible roles in bringing scientific knowledge to value.

Professional Skills

Students should develop professional business skills to operate effectively in organizations and groups. More specifically, students should:

- f. Develop professional cooperation skills.
 - i. Develop presentation skills: the abilities necessary to communicate complex information and deliver professional presentations in different environments.
 - ii. Develop feedback skills
 - iii. Develop meeting skills: the abilities necessary to host and guide meetings in which complex information, different opinions and positions need to be structured to effectively facilitate collection work.
 - iv. Develop teamwork and leadership skills.
 - v. Develop interview techniques: abilities necessary to successfully obtain information by means of an interview in different settings.
 - vi. Develop reasoning and related skills to structure information: develop the abilities to test arguments and bring propositions towards implementation by convincing others.
 - vii. Develop communication and influencing skills.
- g. Develop project management skills.
 - i. Be able to effectively manage projects on the interface of Science and Practice, including becoming familiar with:
 1. Taking Initiative
 2. Managing the workflow
 - a. Preparing a project planning
 - b. Use of KPIs in Planning
 - c. Prioritizing & adjustment (time management, etc.)
 3. Practical Tools
 - a. Effective use of communication technology
 - b. Budget management
 4. Team Management
 - a. Engaging your interdisciplinary team
 - b. Divide and take Responsibility
 - c. Solving problems

- ii. Get acquainted with consultancy analytics and tools to structure complex challenges & information.
 - 1. Utilizing consultancy models to structure complex challenges and transform them into workable solutions.
 - 2. Develop visual thinking skills: the qualities to use visual tools to structure meetings, complex information and group processes.