



Curriculum 2018/2019

Master Scientific Illustration

Introduction

The curriculum consists of three themes:

1. 'Man' (A),
2. 'Animal' (B)
3. 'Surgical intervention in man and animal' (C).

Several workshops and guest lectures will be given besides the regular curriculum (D and E).

The three themes consist of 3 to 5 curriculum parts. Each part consists of one or more assignments in which several aspects of scientific illustration and drawing techniques will be trained.

The level of the assignments has an increasing learning curve, finally resulting in the professional practice level (A3, B5, C3 en C4).

The final graduation consists of three parts:

1. a graduation project (F), resulting in a printed publication.
2. oral examination (G)
3. graduation exhibition (H)

The student makes a portfolio with artwork, which are made during the study.

The printed publication and the portfolio can serve as promotional material for the introduction in professional practice.

A MAN

The theme 'Man' includes the following components:

1. the skeleton of the torso
2. the anatomical model of the torso
3. the anatomical specimen

A1 Skeleton of the torso

Techniques and materials: Graphite pencil 2H-HB-2B, standard paper 100x70cm, 200 grs

Assignment (deadlines in schedule):

- Draw with pencil in several grades a ventral view of the skeleton of a human torso (vertebral column, thorax and pelvis) and the scapula and clavícula, as detailed as possible (scale 1:1).
- Finally add the nomenclature in Latin on transparent, or scan the drawing and make a layout with the nomenclature, in the computer.

Competences: The curriculum unit contributes to competence I - IV

Working method:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: Non

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

A2. The anatomical model of the torso

Techniques and materials: Graphite pencil, standard paper 70x50 cm, 200 grs.

Assignment (deadlines in schedule):

This assignment consists of three parts:

A2: The Anatomical Model Graphite Pencil

- Draw, as detailed as possible, a ventral view of the “somso”-model, with the content of (thorax and) abdomen and supply a number of structures with their Latin names, using indicating lines. Use graphite pencil in several grades, scale 1:1.
- Draw, as detailed as possible, a ventral view of the “somso”-model, without the content of the abdomen and supply a number of structures with their Latin names, using indicator lines. Use graphite pencil in several grades, scale 1:1.

Competences: The curriculum unit contributes to competence I - IV

Working method:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: Non

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In the assignments as written in **A1** and **A2** the students explore by means of observation, measuring and drawing the structural interdependency and “contents” of the thorax, abdomen and pelvis. In addition to acquiring factual anatomic knowledge and familiarising with Latin terminology ***1)**, they should be skilled in the discipline of observation and as a result they shall understand the three-dimensional relation of skeleton and internal organs.

Students obtain anatomical knowledge of the digestive system, the respiratory system and the cardiovascular system.

In assignment **A1** the student practices: form and negative space, proportions, simple foreshortening perspective and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools). In assignment **A2** the student practices: the spatial context 2D-3D, proportions, the principles of form and shapes (convex/ concave). The student acquires anatomical knowledge concerning the gastrointestinal tract (digestive system), respiratory tract (airways) and circulatory tract (heart and blood vessels). Gaining this anatomical knowledge also serves as a preparation for the anatomy lab practice (**A3**). The static / stylized image of the plastic model is completed with observations of the realistic anatomy in the dissecting room. ***2)**

***1)** The aim is not to master as complete as possible a quantity of Latin names, but the students are taught that mastering a basal rate of Latin is necessary during their studies and in practice, to avoid elementary mistakes in the artwork.

***2)** Prior to the first dissecting room visit is a “dissecting room introduction” organized. This introduction is obligatory.

A3. The anatomical specimen

Techniques and materials: Graphite pencil, watercolour, (digital) photography, paper 160/200 grs, Saunders watercolour paper

Assignment (deadlines in schedule):

A3a: The Anatomical Specimen, dissection and registration

- Dissect a part of the human body after consultation with the teachers.
- Draw with pencil in several grades a series of registrations as detailed as possible of several dissection steps (number and view in consultation with the teacher). Scale 1:1.

A3b: The Anatomical Specimen, final artwork

- Make an illustration in watercolour (or another technique in colour), from the same perspective as in the registration series and try to incorporate as many data (observations) as possible from your registrations. Scale 1:1.
- Keep track of hours that you spend working on the final artwork.

Competences: The curriculum unit contributes to competence I - IX and XI

Working method:

Part 1: Lab practice:

During this lab practice the student learns to dissect, to observe and to record. These practical sessions are supported by instruction lectures. Students take part in the practical in groups.

Part 2: Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: A1 and A2 achieved.

Obligation to attend: Students must be present at all lab lectures. If the student is prevented, he/ she must communicate this in time with the instructor.

Contact hours:

Part 1: lab practice: dissection and recording \pm 28 contact hours and 28 hours of independent work (in 7 days).

Part 2: final artwork: every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

Component A3 requires students to engage in dissection studies and record their findings, providing them with a method that will allow them to examine anatomical structures effectively and to represent these structures accurately. Students prepare for the dissections by studying the relevant area of the body with the help of books, atlases, prosected specimens and anatomical models.

Each student dissects a part of the human body (usually an extremity) and makes a series of detailed drawings to register a number of dissection steps. Students also take photographs of the completed specimen. All data thus collected are used to produce a preliminary design (a black-and-white halftone drawing) that serves as a preparation for a detailed watercolour of the specimen. In this design light and dark can be examined. Special attention is paid to definition of textures and the choice of colours. A "translation" should be made of the colours as they are seen on the specimen to a more 'realistic' colour.

The process students go through in this component (A3) is intended to simulate professional practice.

Well before students start to work on their watercolours, they study a number of anatomical atlases to examine the various technical solutions that illustrators have designed and implemented in the past.

Furthermore, time management is crucial in this project. Concentrating for a long period on a delicate watercolour drawing can be exhausting. Efficient management of time and energy by alternating between assignments helps to stay focused.

B ANIMAL

The theme 'Animal' consists of five components:

1. the mammalian locomotor system
2. the animal in vivo
3. dissection of the laboratory rat
4. the mammalian skull
5. a second animal

B1. The mammalian locomotor system (plaster cast)

Techniques and materials: Graphite pencil, Paper 200 grs 50x70 cm.

Assignment (deadlines in schedule):

- Draw with pencil a lateral view of the locomotor system of a mammal (plaster cast dog, lion). Scale 1:1.
- Draw the skeleton into your drawing, with pen and ink on transparent paper or with the computer (adobe Illustrator).

Competences: The curriculum unit contributes to competence I - IV

Working method:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: Non

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

B2. Illustrating the animal in vivo

Techniques and materials: graphite pencil.

Assignment (deadlines in schedule):

- Make a series of drawings/ sketches of a living animal (The species can vary depending on the availability).

Competences: The curriculum unit contributes to competence I - IV and VII - IX

Working method:

Life drawing: drawing from a model under supervision.

Access requirement: Non

Obligation to attend: Students must be present at the lectures. If the student is prevented, he/ she must communicate this in time with the instructor.

Contact hours: 8 hours

Learning Objectives:

In the assignments as written in **B1** and **B2** the students explore by means of observation, measuring and drawing the relationship between the musculoskeletal system and the external form of the (lab) animals. In assignment **B1** the student practices: form and negative space, posture, proportions, perspective foreshortening and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools). The student acquires anatomical knowledge about the musculoskeletal system of a mammal by exploring the relationship between the skeleton and the muscles. Superficial skeleton points are used as markers by which the skeleton is drawn onto the external form of the animal.

In assignment **B2** the student practices: form and negative space, the spatial context 2D-3D, proportions, the principles of sculptural shapes, and the ability to project (imagine) the anatomy of the skeleton in a moving animal while drawing. In this section, we focus on ethology (behavioural science) of the mammal.

This assignment also serves as preparation for the comparative anatomy lab practice (**B3**).

Dissecting animals that you have drawn in life before gives rise to a discussion about the use of animals.

For this purpose, an "introduction dissection lab rat" is organized before the first practical. This introduction is obligatory. During this meeting we will discuss the ethical aspects of the use of animals in medical and biomedical research, industry and education.

B3. Dissection of the laboratory rat

Techniques and materials: graphite pencil, paper, digital camera, computer.

Assignment (deadlines in schedule):

- B3a: Dissection of the Laboratory Rat, dissection
Make during dissection of the laboratory rat and after completion of the dissection classes a series of pencil drawings/ sketches of the dissection stages and anatomy systems. Scale: at least 1:1, preferably larger.
- B3b: Dissection of the Laboratory Rat, registration and final artwork
Document the dissection stages also by digital photographic recordings.
In consultation with the teachers an anatomical system or anatomical dissection is chosen from the registrations to elaborate in a final illustration(s). Text and illustration are combined in a comprehensive infographic and must be presented in a layout that could be one out of a biology book for students. Terminology (in Latin or English) should be added in a logical and aesthetic way to the educational page.
- Keep track of hours that you spend working on the final artwork.

Competences: The curriculum unit contributes to competence I - IX and XI

Working method:

Part 1: Lab practice:

During this lab practice the student learns to dissect, to observe and to record. These practical sessions are supported by instruction lectures. Students take part in the dissection lab in groups.

Part 2: Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: B1 and B2 achieved.

Obligation to attend: Students must be present at all lab lectures. If the student is prevented, he/ she must communicate this in time with the instructor.

Contact hours:

Part 1: lab practice: dissection and recording ± 40 contact hours and 40 hours of independent work (in 10 days).

Part 2: final artwork: every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

Besides acquiring dissecting skills the student practises: form and negative space, proportions, the principles of sculptural shapes (convex/ concave) and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools). During dissection also the hand-eye coordination is developed and trained, which is a very important skill for a good illustrator.

The lab rat is chosen because this animal is commonly used in (medical and biomedical) research and alumni are likely to get assignments about this animal in future professional life.

During 6 lab practicals, students will gain insight into the structure and function of the following systems: digestive tract (digestive system), respiratory tract (airways), circulatory tract (heart and blood vessels), urinary tract, genital tract, nervous system, and the basic embryology is.

The comparative anatomy (human / animal and animal / animal) plays an important role in these sessions. Every student has their 'own' specimen and is responsible for it during all sessions, which means that the student gets familiar with the various preservation methods.

Understanding the structure and function of the various systems in the rat is of great importance in microsurgical illustration of the lab rat **C3**.

B4. The mammalian skull

Technique and material: Graphite pencil, Schoellers Hammer 4R paper

Assignment (deadlines in schedule):

- Draw with pencil on SH paper (graphite pencil several grades) a ventral view, as detailed as possible, of the skull a mammal (without mandibula). There are several species available.
Scale: a large skull (like a horse skull) 1:1 or smaller; an average skull 1:1 and a small skull 2:1 or 3:1 or larger if necessary.
- Keep track of hours that you spend working on the total assignment and specify the activities.

Competences: The curriculum unit contributes to competence I - V

Working form:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: B1 and B2 achieved.

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment students learn how an anatomical structure can be visualised effectively and detailed in a halftone technique. In the assignment the student practises: form and negative space, proportions, the principles of sculptural shapes (convex/ concave), depth of field, perspective and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools).

During the assignment, extra attention is paid to the surface texture and illumination (light and dark). Every student has their personal skull and is responsible for it during the accomplishment of the assignment. Furthermore time management is crucial in this project. Concentrating for a long period on a delicate graphite drawing can be exhausting. Efficient management of time and energy by alternating between assignments helps to stay focused.

B5. A second animal

Techniques and material: Graphite pencil, colour technique (free of choice), digital photography.

Assignment (deadlines in schedule):

- Record by means of photographs and drawings/sketches a number of dissection stages during the dissection (without supervision) of a second animal.
- Document the dissection stages also by digital photographic recordings.
- In consultation with the teachers (who play the role of client to whom you want to sell the illustration) an anatomical system is chosen from the registrations to elaborate in (a) final illustration(s) in a drawing medium at choice. Text and illustrations are combined in a comprehensive infographic or composition drawing and must be presented in a layout for a specific target audience. Terminology (in Latin or English) and text should be added in a logical and aesthetic way to the functional/ educational page.
- Make an estimate of the time you are going to spend on it and calculate a quote.
- Keep track of hours that you spend working on the research, sketches and final artwork. At the end of the project the prices, time and efficiency are evaluated.

Competences: The curriculum unit contributes to competence I – IX and XI

Working form:

Part 1: Lab practice:

During this lab practice the student learns to dissect, to observe and to record. These practical sessions are supported by instruction lectures. Students take part in the practical in groups.

Part 2: Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: B1 and B2 achieved.

Obligation to attend: Students must be present at all lab lectures. If the student is prevented, he/ she must communicate this in time with the instructor.

Contact hours:

Part 1: lab practice: dissection and recording ± 8 contact hours and 40 hours of independent work.

Part 2: final artwork: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment, students learn to dissect an animal independently and register the dissection stages using drawings and photographs. This data is then processed to produce a correct composition drawing or infographic in a drawing medium of choice.

In the preparation of the artwork as described in the assignment, acquired skills in B3 are applied practically. Choices between stylized and realistic visualizations are made in order to get the best results in form and function. Storytelling plays an important role in this assignment.

The procedure in B5 is a simulation of professional practice. Time management and business aspects are trained.

C SURGERY OF MAN AND ANIMAL

The 'Surgery on man and animal' theme consists of four components:

1. microsurgery on the laboratory rat (instruments and hands)
2. microsurgery on the laboratory rat (experimental animal model)
3. microsurgery on the laboratory rat (surgical procedure)
4. surgery in the hospital (Maastricht University Medical Center+)

C1 Microsurgery on the laboratory rat (instruments and hands)

Techniques and materials: Graphite pencil, pen and ink, several drawing templates, computer Pen and ink, Schoellershammer paper (Glatt) 70x50 cm.

Assignment (deadlines in schedule):

C1a Instruments and hands

- Make a series of (line) drawings (construction drawings) of several (micro)surgical instruments.
- Make a series of hand studies.
- Draw the skeleton of the hand in one or two of the studies.

C1b Instruments and hands final artwork

- Make a line drawing of one of the hand studies with an instrument

Competences: The curriculum unit contributes to competence I – VI

Working form:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: non

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment, students learn line drawing techniques in which hands and instruments can be visualised effectively. By doing the assignment he/ she trains an understanding of form and negative space, proportions (frontal and $\frac{3}{4}$ views), perspective, foreshortening and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools).

The sketches and drawings of the instruments are drawn into ink, where special attention is paid to the technical aspects of drawing with pen and ink and the use of various types of tools and rulers.

The anatomy of the hand is studied and the student draws the skeleton of the hand in one or two of the studies to understand the relationship between form and function of the hand.

The assignment in C1 serves as preparation for C2 and C3.

C2 Microsurgery of the laboratory rat (experimental animal model)

Techniques and materials: Graphite pencil, watercolour, animal model (MD PVC-rat), instruments.

Assignment (deadlines in schedule):

- Make a watercolour (scale 1:1) of a simulated microsurgical intervention on a model of the laboratory rat using the recordings of hand positions done by a micro surgeon (slides, photographs). Gather all material you can use to make a convincing illustration (your hand studies, instrument construction drawings, registrations and photos of your rat dissections, veterinary anatomy books).

Competences: The curriculum unit contributes to competence I – VI

Working form:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: non

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment, students learn line drawing techniques in which hands and instruments can be visualised effectively in colour (watercolour, colour pencil). By doing the assignment he/ she trains form and negative space, proportions, perspective, foreshortening and precise drawing skills (in which ratio and form are checked using a ruler/ compass tools).

The student has to come up with solutions to the specific problems that arise when working with slides/ photos, for example the distortions caused by the lens of the camera.

The model, instead of a real rat and the fictitious surgery was chosen to avoid unnecessary use of animals. By using the material and examples collected during the dissection classes of the laboratory rat (colour photos and drawings) the student makes a realistic picture of the abstracted animal model and the contents of the abdomen. Just like in the professional practice he/ she has to be creative to produce a good illustration with help of all available facts and examples, which are not always ideal.

In preparation for the final artwork in colour, the student makes a black/ white halftone version to determine the light fall. Because the student uses an imaginary light source, he/ she is forced to reconstruct the high lights and shadows.

The assignment in C₂ serves as a preparation for C₃.

C₃ Microsurgery on the laboratory rat (surgical procedure)

Techniques and materials: Graphite pencil, fine liners, videotapes ‘microsurgery on the laboratory rat’, computer.

Assignment (deadlines in schedule):

- Analyse the microsurgical procedure and make a surgery report, followed by a illustrations list (that fits best with the chosen target audience. For instance: illustrating for patient education demands a different approach than illustrating for medical specialists.
- Make an estimate of the time you are going to spend on it and calculate a quote.
- Keep track of hours that you spend working on the research, sketches and final artwork. At the end of the project the prices, time and efficiency are evaluated.
- Make a series of line drawings of a microsurgical operation on the laboratory rat using existing recordings (videotapes).
- Complete these drawings with text and prepare them on the computer for an imaginary publication.

Competences: The curriculum unit contributes to competence I – XI

Working form:

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: C1 and C2 achieved.

Obligation to attend: The introductions of the curriculum components are compulsory. The student manages his/ her own time after the introduction

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment, students train a method/ workflow (with all specific techniques) in which a microsurgical procedure can be visualised effectively in a small series of illustrations. The surgical procedure is shown on video (dvd) to enable students to paly back parts of the procedure several times. Working from dvd also prevents the unnecessary use of real animals. Illustrating for different target audiences is trained.

Students make an analysis of the operation together with the teacher. Based on the analysis they have to write a surgical report, and an illustration list. While making the list they have to think already how they will illustrate the procedure in a way that fits with a chosen target audience.

In creating these series of surgical illustrations students practise the skills that have been learned in C1 and applied in C2.

The assignment in C3 is a simulation of the professional practice and serves as a preparation for C4.

C4 Surgery in the hospital

Techniques and materials: Graphite pencil, pen and ink, registration sketches, photography, computer.

Assignment (deadlines in schedule):

- Make a series of line drawings of a surgical intervention on a patient, based on sketches, photographs and other data collected by the student in the operation room.
- Prepare these drawings for printing/ publication on the computer.
- Make an estimate of the time you are going to spend on it and calculate a quote.
- Keep track of hours that you spend working on the research, sketches and final artwork. At the end of the project the prices, time and efficiency are evaluated.

Competences: The curriculum unit contributes to competence I – XI

Working method:

Practical at the Academic Hospital Maastricht (Maastricht University Medical Center+):

The students observe during a surgical procedure and make sketches, notes and photos.

Atelier Model:

The central teaching method is that the students work independently on the visualisation task in the academy studio. The central learning experience for the student is created here and supported by individual assistance, which the student receives during the work, directed by the core lecturers or as required by the students.

Also the other students play an important role by discussing the subject with each other and exchanging ideas.

Self-study:

At the master's level, students should be able to gain a large part of their necessary knowledge and insight by working on their assignments.

Access requirement: A1-A3 and C1-C3 achieved.

Obligation to attend: The teacher arranges a date with the surgeon. Students must be present in time at the operating room in the hospital. If the student is prevented, he/ she must communicate this in time with the teacher.

Contact hours:

Part 1: Operation room: recording \pm 4 contact hours and 40 hours of independent work.

Part 2: Final artwork: every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

Learning Objectives:

In this assignment, students reuse the method/ workflow (with all specific techniques) that was trained in C3, in which a surgical procedure on humans can be visualised effectively in a series of illustrations. This time the students make their own recordings and photographs of the surgical procedure in the clinic.

Preparations for attending the operation will be done independently by the student; the surgical procedures and techniques are studied in the library and on the Internet, the student is studying the topography of the surgery area using own documentation, books, atlases, specimen from the dissection room and anatomical models. Furthermore he/ she is preparing technically for the photography.

The student gets detailed instructions from the teacher on the behaviour rules (do's and don'ts) in a surgery room and discusses the way in which an operation can be captured using the most effective photography.

During surgery, the student takes notes, makes sketches and photos and gathers information that can be helpful for creating the illustrations (used instruments, peripherals, etc.). The student makes a preliminary

design in pencil (or computer graphics) and discusses the plan with the teacher. In doubt the surgeon will be asked to have a look as well before the design is worked out in the final illustrations.

Communication skills with professionals from the medical field are trained during this assignment and also advising skills in order to be able to advise the medical specialist about the best way to illustrate the scientific or medical subject. Knowledge of the basic anatomy and terminology in Latin and English is necessary to fulfil this assignment. The student should have developed this knowledge by then.

The method in C4 is a simulation of professional practice.

D SUPPORTING COURSES

A supporting course is defined as a course in a discipline that complements the regular curriculum. Supporting courses may be required in order to fulfil the requirements of the MSI programme.

Supporting courses that are given are:

1. Life drawing, nude model and portrait
2. Life drawing with emphasis of anatomical structure
3. Basics of graphical software

D₁ Life drawing, nude model and portrait

Techniques and materials: Graphite pencil, colour pencil, pastels, Siberian chalk and charcoal, pen and ink, brush, sanguine and bistre chalk, watercolour etc.

Assignment (deadlines in schedule):

- drawing from nude model
- Drawing from skeleton and plaster models
- (self) study: 'Die Gestalt des Menschen' by G. Bammes

drawing exercises:

- composition, form and negative space
- posture, spatial context 2D / 3D
- proportions: frontal / lateral / $\frac{3}{4}$ view
- simple perspectival foreshortening
- recognition of skeleton points on the surface
- principles of sculptural shapes (convex / concave) in relation to skeletal and muscle structure

Competences: The curriculum unit contributes to competence I - IV

Working form:

Life drawing class:

Classroom model study, under supervision.

Access requirement: Non

Obligation to attend: In the first year students must be present at all life model classes. If the student is prevented, he/ she must communicate this in time with the teacher.

Contact hours: 8 hours a week

D2 Life drawing with emphasis of anatomical structure

Techniques and materials: Graphite pencil, colour pencil, pastels, Siberian chalk and charcoal, pen and ink, brush, computer

Components:

- life model drawing with emphasis of anatomical structure
- introduction dissecting room + short course anatomy of the musculoskeletal system

content:

- theory:
 - size and proportion
 - thorax / shoulder
 - abdomen / pelvis
 - leg / foot
 - arm / hand
 - head / neck (extra preparation for workshop 3-D face mapping)
- Drawing studies of the relationship between skeletal system, muscle groups and outer shape based on a plaster cast model of the musculoskeletal system and the skeleton.
- Drawing of projections of the skeleton and muscles in life model studies
- Introduction dissecting room + thorax / abdomen
 - Shoulder girdle / arm (*in vivo* and dissection room)
 - Pelvis / leg (*in vivo* and dissection room)

Competences: The curriculum unit contributes to competence I - IX

Working form:

Life drawing class:

Classroom model study, under supervision.

Access requirement: Non

Obligation to attend: In the first year students must be present at all life model classes. If the student is prevented, he/ she must communicate this in time with the teacher.

Contact hours: Every day there is a teacher present and available for consultation and feedback. The contact hours are varying.

E WORKSHOPS AND GUEST LECTURES

A selection of the listed lectures and workshop and more are offered every year. Check your schedule for the scheduled workshops and lectures.

Offered workshops:

- Watercolour techniques:
R. Trompert (Rogier Trompert Medical Art '- Maastricht). Duration: 2 x 1 day
- '(Macro) photography of (animal) dissections:
P. van Dijk (A / E UM). Duration: 0.5 days
- 'Face Mapping' (3-D plastic reconstruction of the face based on the mimic musculature of the human):
R. Baker (Manimal Works) / R. Neave (RN / DS Partnership UK) / J. Spee MSI. Duration: min. 3 days
- Cinema 4D: Basic 3D control software.
Sascha Bien
- Colour pencil drawing. Duration 0.5 days
Jessica Leenen, *medical artist*
- Summer Course Physical Anthropology. Duration 5.5 days
amC Amsterdam
- Lecture and workshop Botanical Illustration
Esmée Winkel

(Guest) lectures:

- History of scientific illustration "(especially the medical illustration):
duration: 0.5 days
I. Wielage and J. Spee
- College medical imaging AZM
duration: 0.5 days
(if enough interest)
- Drawing department of the Natural History Museum NATURALIS
Erik-Jan Bosch, *scientific illustrator at Naturalis*
- Medical illustrating in eye surgery. Duration 0.5 days
Jessica Leenen, *medical artist*
- Lecture and workshop Botanical Illustration
Esmée Winkel
- Guest lecture and workshop
Dr Levent Efe, CMI, Medical illustration studios, Brunswick Australia

Workshops Graphical software

Techniques and materials: computer, hardware and software

computer exercises:

- Scanning and retouching drawings in Adobe Photoshop
- The control of the scanner from Adobe Photoshop
- Working in Adobe Photoshop with (among others) layers, selections and the tool palette
- Dealing in Adobe Photoshop with colour / colour profiles / resolution
- Making a layout and nomenclature in Illustrator
- Photoshop vs Illustrator: vector vs bitmap
- Dealing with line and tools in Adobe Illustrator
- Working with text in Adobe Illustrator
- Import bitmaps in Adobe Illustrator, exporting vector files into Adobe Photoshop
- Printing documents from Adobe Photoshop and Adobe Illustrator (over a network)
- Adobe InDesign
- Etc.

Competences: The curriculum unit contributes to competence I – IV

Working form:

Computer lab:

Exercises in the basics of hardware and software

Access requirement: Non

Obligation to attend: Students must be present at all classes unless the student has sufficient computer skills and is able to do some assignment set by the teacher.

Contact hours: vary

F GRADUATION PROJECT

The MSI program assesses the realisation of all the final qualifications at master level by means of the so-called graduation project. This graduation project should be considered as a master thesis. To reach the intended high standard the program knows a rigorous procedure for both the realisation of the paper and the evaluation. The eight evaluation criteria are also applied to this final project.

A student is admitted to the final project when the previous assignments have been completed at least a sufficient level. The student perceives a project assignment in collaboration with his or her mentor. This involves a visualization issue concerning a current scientific topic. The student submits in consultation with the mentor a written proposal of the project to the core teachers. The core teachers approve the proposal regarding a time schedule. In the visualisation process, the external client obviously plays a major role. The assignment will lead to an examination publication: a professional publication of a scientific illustrator. The publication consists of the visualisation of the topic and an explanatory text. The text reflects on the visualisation process and the visualisation technique (s). This includes a necessary explanation of the need for the visualisation of this specific scientific problem and the reflection on the visualisation process. Illustrating at master level is in itself a form of research and acquiring knowledge.

The Board of Examiners (the core teachers and appointed external examiners) will assess the draft of the publication and after having decided to give permission to print the publication they agree that the graduation program as a whole is at least sufficient. The final determination of the valuation is based on the publication and an oral exam. The examiners are the core teachers, which includes the mentor of the student. They can also give their written opinion. Some of the content experts involved in the project will be present at the final examination as external examiner(s).

Topic

The topic of the graduation project will be determined in consultation with the teachers. In the period prior to the graduation, the student investigates potential projects, and looks for external experts who can guide a project in a specific field of (bio) medical sciences. Consider for example medical specialists, biologists, palaeontologists and authors of scientific publications. The graduation project is a practical assignment. Ideally the illustrations that are created in this period are useful for the external expert. At the same time, the student develops communication skills with scientists and enlarges his or her professional capabilities.

The student proposes a project to the core teachers. When a student has not found an appropriate project, teachers can advise the student and can put the student in contact with, for example, medical specialists from the University Hospital Maastricht.

Guidance

For the duration of the project, in consultation with the student one of the teachers is appointed as personal tutor, the mentor.

Depending on the chosen topic the student and his/ her mentor will search for expertise in the Maastricht University Medical Center+) or on universities, clinics and other institutes elsewhere.

Preparation

At the beginning of the final graduation period the student will make a 'plan of action' in consultation with his/her mentor. In a time frame is described how the various activities can be performed with optimal efficiency during this period.

Preparations for the final exam project might include:

- collecting and reading literature about the chosen topic
- the collection of existing visual material about the chosen topic
- establish contacts with content expert(s).

Effectuation

The graduation project is carried out independently and consists of three parts:

- 1 the design and implementation of illustrations in various techniques
- 2 the chosen subject, illustration techniques and materials used are described
- 3 the design and printing of the publication

Explanation

After the illustrations for the publication have been completed and the final exam project is described in English, the work is reviewed by the coordinators in consultation with the mentor teachers and external expert(s) to assess whether the results are of sufficient quality to be presented to the Board of Examiners.

A representative number of members of the exam committee then give their opinions.

Only when this judgment is positive, there can be passed to the printing of the publication and the date of the oral examination will be set.

ad 1.

In the design phase of the illustrations it may be necessary, depending on the chosen topic, to use one or more independently dissected anatomical specimens; when it is necessary the student consults during the dissection one or more expert(s).

To visualise the chosen subject a series of illustrations designed and made, in which (where this makes sense) the widest possible variety of (drawing-)techniques is applied.

The publication should show what the technical skills of the graduate are.

During the design phase and after the completion of the artwork the student has regular contact with the mentor, the external expert(s), and the other teachers.

ad 2.

The publication is digitally designed and made print-ready using amongst others InDesign.

The design is done on the basis of an existing, fixed format.

A cover for the publication should be designed and digitally performed.

During the production phase of the publication, the student maintains contact with the printer.

The printed version of the publication should be ready at least two weeks before the oral exam to give the members of the examination board the opportunity to prepare themselves well and assess it.

G ORAL EXAM

On the basis of the printed publication, optionally supplemented with (a number of) artworks from the portfolio, an oral examination is taken by the Board of Examiners.

The exam is held in the form of an interview/ work meeting and takes approximately an hour.

At the beginning of the exam, the student gives a short oral presentation of the described and illustrated subject of the publication, and the members of the committee are given the opportunity to ask questions about the content and design of the publication.

After the committee has discussed their opinions the candidate will be given decisive answer.

H GRADUATION EXHIBITION

In the period between the completion of the publication and the oral exam the student (whether or not in collaboration with fellow students) sets up an exhibition.

The exhibition shows as much as possible the original illustrations and artworks from the publication, possibly supplemented with a selection of works produced by the student during the study.

The selection of the artworks to be exhibited will be done in consultation with the coordinators and the teachers.

See Final Exam Guide for more information.

Competencies MSI

I

Competencies to make a visual investigation

The Scientific Illustrator is able to approach the visualisation theme in a methodical and investigative way.
the student:

- 1.1 realizes that the visualisation helps to spread knowledge and to construct knowledge of the object or process that has to be visualised.
- 1.2 distinguishes in the process of visualisation the sketch, design, final result and has understanding of the different stages of visualisation as necessary research stages of a visualisation study.
- 1.3 has understanding of the meaning of the different visualisation stages serving the necessary organization of content focused on external communication (to the scientist, the publicist) and can use the results of the previous stages.
- 1.4 the Scientific Illustrator makes a distinction between the external visible human and animal anatomy, the underlying anatomy and functions and the by science described interaction needed for visualisation

II

Object investigative skills

The Scientific Illustrator is able to methodically apply at a basic level some study methods of anatomical structures of man and animal.

De student:

- 2.1 is well capable of observing professional scientific study and make use of the results.
- 2.2 is able to acquire the required knowledge methodically by himself and can collect and investigate supportive material for specified visualisation issues.
- 2.3 Is at a basic level capable to dissect (parts of) animals and humans and to observe a process of professional dissection and make a (visual) registration the results.
- 2.4 Can, at a basic level, make a preparation of a dissected part or can observe a professional dissection process. He or she is capable of observing steps in the process of dissection and (visual) make registrations of the results that serve the visualization issues well.
- 2.5 is able to study the topography and the area of surgery and can make a registration of the surgical procedure (photo, sketch, note).
- 2.6 is able to register effectively (visual) and document their own study results in various stages of research, in particular by drawing and using (digital) photography.

III

Visually interpretive abilities

The Scientific Illustrator is capable to make his own clear visual interpretation of the topic that is in accordance to the scientific description

The student:

- 3.1 is familiar with - and has critical understanding of classical and contemporary scientific illustrative approaches, in particular concerning human, animal and surgical procedure and can reproduce some of these approaches.
- 3.2 is, in particular, capable of visualising the relationship between the musculoskeletal system and external form of man and animal (for visualisation of the appearing on the surface of anatomical principles of man and animal (muscle, skeleton).
- 3.3 is capable of visualising a representation of a broad anatomical scientific approach of man and animal from macroscopic to microscopic level.

- 3.4 is capable of displaying (micro) surgical instrumentation in use (hand) and the operating environment in man and animal.
- 3.5 is capable of illustrating the process of professional (micro) surgery in humans and animals.
- 3.6 is capable of visualisation (imaginative reproduction) of deeper and / or not directly visible processes.

IV

Technical capabilities

The Scientific Illustrator can make use of various visualisation tools and techniques predominantly 2D and some 3D for the display of a three-dimensional scientific reality

The student:

- 4.1 is capable of visualisation by using a broad range of materials and techniques: pencil, various chalk, charcoal, pen, pen and ink, ink wash, pastel watercolour / mixed media (digital) photography and computer techniques / graphics software.
- 4.2 can make use of the effects of composition, form and counter form, proportions and spatial context, 2D-3D, recognizing skeleton points on the surface and making use of the principles of sculptural shapes (convex-concave).

V

Abilities to transfer

The student:

- 5.1 is able to make use of specific developed visualisation capacities concerning a characteristic scientific context so that the characteristics of this scientific context are done right.

VI

Knowledge of biomedical science

The student:

- 6.1 is familiar with the specific approaches and relevant principles of biomedical science.

VII

Knowledge of human and animal anatomy and life functions

The Scientific Illustrator is familiar with and has understanding of human and animal anatomy and life functions on both macroscopic and microscopic level.

The student:

- 7.1 is familiar with modern and historical anatomical scientific knowledge including the Latin terminology of humans and animals, can read scientific studies in this area, and can verbal communicate the knowledge.
- 7.2 at least has drawn the human skeleton, torso, digestive organs, respiratory system, cardiovascular system, urinary and reproductive system, nervous system and endocrinon, as well isolated as in relation to their function and their musculoskeletal position.

VIII

Dealing with ethical issues

The student:

- 8.1 is familiar with - and has understanding of ethical issues and issues concerning the use of animals, patients, human remains and does act with ethical considerations regarding this field.

IX

Knowledge of etymology, comparative animal anatomy and embryology

The student:

9.1 is familiar with and has an understanding of ethology, comparative animal anatomy and embryology.

X

Knowledge of professional practice

The student:

10.1 is familiar with medical, biological and surgical illustration in the (national and international) professional practice.

XI

Personal professional capabilities

The Scientific Illustrator has developed a range of personal and professional capabilities.

The student:

11.1 works with high accuracy and concentration

11.2 has a well-developed ability of perception and observation.

11.3 possesses well-developed business entrepreneurial capacities (commercial considerations, financial considerations, corporate entity).

11.4 focuses on quality.

11.5 is capable to work with an analytical approach.

11.6 can work with people from different disciplines.

11.7 the artwork of scientific illustrator demonstrates that he/ she can communicate with people from different disciplines.

11.8 is capable to give a presentation of used methods, considerations and arguments for diverse audiences (scientists, colleagues).