Course outline

SCIBIOM-201, Functional Anatomy
Spring 2021

FUNCTIONAL

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Spring 2021

Classroom no:	TBD / Online
Class times:	Tuesday, 11:00-13:00
	Friday, 8:45-10:45
Instructor:	Dr. Frans van Overveld
Email:	f.vanoverveld@ucr.nl
Tel:	0118 - 655523
Office no. & location:	Eleanor 2.02
Office hours:	By appointment

I. Track information

a) Prerequisites for this course: none, but Introduction to Life Science (SCILIFE 101) is recommended.
b) This course is part of the Biomedical Sciences Track and an essential part of the Pre-Medical Program.
c) Other courses which are relevant to this course – e.g. as part of a minor: Functional Anatomy (SCIBIOM 201) is complementary and forms a triad with Human Physiology (SCILIFE 202) and Mechanisms of Diseases (SCIBIOM 202). Other relevant courses: Introduction to Life Science (SCILIFE 101).

For further information about the track, please see the track document available on the UCR intranet.

II. Course description

The course gives an overview of important aspects of the **medical and functional anatomy and histology** (as well as embryology) of the walls and organs of especially the human trunk, including thorax, abdomen, and pelvis. The profoundness and extent of the subjects taught in this course will be at the level of the first and second year of the medical curricula at the Dutch Universities. For more detailed anatomy and histology (and also embryology) the student is referred to textbooks and scientific journals concerning special subjects of anatomy/histology and/or clinical disciplines.
Although the primary concern of anatomy is that of the structure, structure and function are always considered together. Moreover, by means of surface anatomy, endoscopic anatomy and radiological anatomy, emphasis is placed on the anatomy of the living body. Anatomy can be studied from dissection of dead corpses in the dissecting room (which is included at the end of the course). While this provides a good insight in the structural composition of the dead body, in the medical setting the knowledge about anatomy, obtained in the dissection room, should be extrapolated by the student to the living body of a patient. During the study of anatomy, the student must develop the skills to look through the skin of a patient, knowing exactly what lies behind. In this context, anatomy means living anatomy.

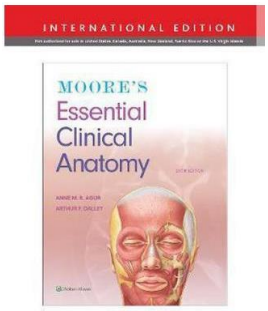
III. Study Load

This course earns students four credits (equivalent to 7.5 ECTS). The class meets twice a week for two hours. Preparation time is approximately 10 hours per week.

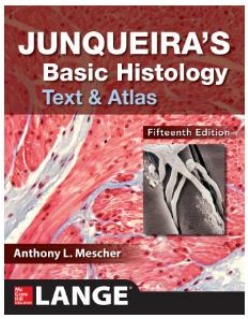
IV. Course materials

a) Required books and literature:

- Agur, Dalley. *Moore's* ***Essential Clinical Anatomy***. 6th International Edition, 2019. Wolters Kluwer, ISBN-13: 978-1-9751-1443-5



- Mescher. ***Junqueira's Basic Histology; Text and Atlas***. 15th Edition, 2018. Lange. ISBN-13: 978-1-2600-2617-7. E-version available via Library University Utrecht: https://accessmedicine-mhmedical-com.proxy.library.uu.nl/book.aspx?bookid=2430



b) Recommended books and literature:

- N/A

c) Other materials:

- Histology @ Yale. http://medcell.med.yale.edu/histology/histology.php
- All other course materials will be put on Moodle

V. Course organization and requirements

a) General format of class meetings

The order of sequence of the subjects in this course will be: first the **anatomy and histology of thoracic structures**, then those of **abdominal structures**, and finally those of **pelvic structures**.

Class meetings will comprise interactive lectures, group presentations, discussions, group and individual work. Field trips include a dissection class at the Department of Pathology of the

UMC Utrecht, and a visit to an Anatomical Museum (TBA, depending on corona measures). **Attendance** is mandatory. It is essential that students do the group and the individual work and that they are familiar with the assigned reading.
Deadlines: all revision questions must be handed in at the start of class on the due date. All other writing assignments must be submitted through the Hand-in function on Moodle (see below). Written work that is late loses 5 marks per day (e.g. a grade of 90 becomes an 85, an 85 becomes an 80, etc.). Late work will be accepted according to this policy up to a maximum of 5 working days after the due date. Any work submitted after this point will be capped at 50% (i.e. you will be graded on a scale where 50% represents the highest grade you can achieve, e.g. a paper that would normally achieve 50% on a normal 100-point scale will now only be worth 25%).
Mobile phones and other devices which connect to the internet must not be used in class. If you are seen using these devices you will be required to hand in your device at the start of class every session from that point forward.
Special needs: students with documented learning disabilities or special needs should make their needs known to the instructor at the start of the course.

b) What are you expecting of students

The course starts on Tuesday 2nd February and ends on Friday 21st May 2021. In this period the student is supposed to spend 210 hours to the study of this course. This study load comprises 60 hours of contact with the lecturer and 150 hours of self-study by the student. The lecture hours are used for:

- the presentation of specific organs and structures of the human body by the lecturer
- the discussion between lecturer and students about revision questions raised from the various instructions; each set of revision questions refers to defined chapters/pages in the textbooks and forms the guideline for the student to study a special subject
- the poster presentation sessions
- the presentation of papers written by the students
- the presentation of a so-called micro-class: a 10 minute presentation on a specific learning objective from the Yale Histology course
- the intermediate and final examination

Besides attending the classes and all other activities, the students have to study the corresponding chapters of the text books before class. The students need to bring the books every time to class. In the chapters the student will find extensive descriptive texts, illustrations, and useful examples. To stimulate regular study and to test the level of knowledge and insight during the course, sets of revision questions have to be answered and handed-in in class at regular time points.
All other assignments are described in detail in paragraph IX, Appendices, at the end of this course manual.
This semester The Anatomy Dinner, as part of the course (like the last 3 years), cannot take place due to corona measures.

c) Rules for missing classes and deadlines

Class attendance is mandatory. The instructor and the tutor should be informed **before class** in case of illness or any other urgent reason to excuse class. Missing more than 4 classes will result in grade deduction. According to UCR academic rules and procedures, the course is failed when 25% or more of the classes are missed.

On Thursday **27th May 2021**, I will offer **late exams** for those having excused an earlier exam for a valid reason. **No late exams are possible during the semester**.

d) Procedures for communication and use of Moodle

Submitting written work: unless otherwise instructed, all written work, including PowerPoints® of presentations and micro-classes, must be submitted via Moodle. All assignments (presentations, poster, paper, etc.) can be posted in the Moodle directories specifically created for this purpose (Hand-in). **All assignments will be automatically checked for plagiarism using Urkund®**. Plagiarism is a serious academic offence which carries heavy sanctions. Make yourself familiar with the UCR Plagiarism Policy (see your Student Handbook).

The PowerPoint® presentations of each class will also be uploaded in Moodle.

Outside class, the student may contact the instructor at f.vanoverveld@ucr.nl. In addition, the instructor has set office hours by appointment.

e) Other

This course is subject to UCR academic rules and procedures. Both students and instructors are required to know and follow these rules and procedures.

VI. Assessment

a) Grading of the course

There will be 2 written exams during the course and 4 assignments. An intermediate exam is scheduled for 19th March 2021, and the final exam is planned for 21st May 2021. Intermediate and final exams will consist of open questions. A number of questions will be taken from the revision questions. The student will get a maximum of 120 minutes to answer all questions of the exam. Scoring will take into account correctness/ clarity of the answers. The 2 exams are part of the final grade, which is composed as follows:

- Revision questions: 20% (for all sets)
- Intermediate exam: 15%
- Micro-class: 10%
- Final exam: 25%
- Paper: 15%
- Poster presentation (group): 10%
- Class participation: 5%

b) Main criteria on grading

Main criteria for the presentations: ability to convey message, depth/breath of presentation, interaction with class.

A presentation will be scored by the instructor and the audience (the students in class; 10% of the grade) based on the following criteria:

- Clear slides (number/ short/ compact/ letter type) (10%)
- The structure and coherence of the presentation (10%)
- The use of appropriate illustrations/ figures to present details (10%)
- The performance (intonation, speaking pace and clearness) (10%)
- The dosage of information (10%)
- The use of an appropriate introduction (10%)
- The use of an appropriate conclusion and summary (10%)
- Is there an appropriate discussion (10%)
- Perception of the presenter and formulation of follow-up research (10%)
- Was the message transferred? (10%)

Main criteria for paper grading: structure/readability 30%, knowledge of topic/use of available literature 40% and ability to express own opinion/ideas 30%. Failing to hand in your paper or scoring <50% on the final paper means failing the course. Missing the deadlines means grade deduction (2% per day late).

VII. Course schedule

The schedule in this manual may need to be adjusted during the course of the semester to accommodate the schedules of guest lecturers, or in case of instructor illness or any other unforeseen situations. The final schedule is the one on Moodle.

Time	Topics to be discussed	Course material used	Assignments and assessment
Week 1 Session 1 02/02/2021	Introduction		Creating "The perfect body"
Week 1 Session 2 05/02/2021	Anatomical positions Introduction to histology and epithelia	Junquiera (J): chapters 1+4	
Week 2 Session 1 09/02/2021	Introduction skeleton Revision questions *Histology*	Moore (M): pages 9-17 J: ch. 8 Yale (Y): Bone	Hand-in revision questions *Histology* (J:12)
Week 2 Session 2 12/02/2021	Skeleton activities Revision questions *Bones*	M: p. 92-102, 411-421	Hand-in revision questions *Bones* (J:30)
Week 3 Session 1 16/02/2021	Muscles and connective tissue Microclass *Muscles* Microclass *Connective tissue*	M: p. 17-21, 76-87 J: ch. 5+10 Y: Muscle Y: Connective tissue	Hand-in drawings and measurements of skeleton work
Week 3 Session 2 19/02/2021	Cardiovascular system: blood vessels (1) Revision questions *Muscles* and *Connective tissue* Microclass *Blood vessels*	M: p. 21-27, 103-111 J: ch. 11+12 Y: Blood vessels, blood and bone marrow	Hand-in revision questions *Muscles* and *Connective tissue* (J:36)

Time	Topics to be discussed	Course material used	Assignments and assessment
Week 4 Session 1 23/02/2021	Cardiovascular system: the heart (2) Revision questions *Blood vessels*	M: p. 217-238	Hand-in revision questions *Blood vessels* (J:49)
Week 4 Session 2 26/02/2021	Respiratory system (1) Revision questions *The heart* Microclass *Respiratory*	M: p. 196-198 (thoracic muscles), 204-217 J: ch. 17 Y: Respiratory	Hand-in revision questions *The heart* (J:66) Dr Ali Gulam (TBD)
Week 5 Session 1 02/03/2021	Respiratory system (2) Revision questions *Respiratory*	J: ch. 17 Y: Respiratory	Hand-in revision questions *Respiratory* (J:49)
Week 5 Session 2 05/03/2021	Imaging in class Radiology	M: p. 41-43 Guest speaker: Dr. Erik Van Hul, AZ Nikolaas, Sint-Niklaas, Belgium	TBD
Week 6 Session 1 09/03/2021	Development Revision questions *Embryology*	Williams Obstetrics, Ch. 7: Embryogenesis and Fetal Morphological Development; http://www.3dembryoatlas.com/blank	Hand-in revision questions *Embryology* (J:42)
Week 6 Session 2 12/03/2021	Poster presentations (part 1)		Hand-in of 1 page summary of poster (all posters!) on Moodle
Week 7 Session 1 16/03/2021	Poster presentations (part 2)		
Week 7 Session 2 19/03/2021	**Intermediate Test**		***Intermediate test* (see Moodle)**
Week 8 Session 1 23/03/2021	Digestive system: intestines (1) Microclass *Digestive organs (1)*	M: p. 278-296 J: ch. 15 (intro, structure, stomach, intestines) Y: GI tract	
Week 8 Session 2 26/03/2021	Digestive system: spleen, pancreas, liver (2) Revision questions *GI-tract* Microclass *Digestive organs (2)*	M: p. 296-309 J: ch. 16 (pancreas, liver, figure 16-9) Y: Digestive organs	Hand-in revision questions *GI-tract* (J:92)
Week Session 1 29/03/2021	--- BREAK ---		
Week Session 2 02/04/2021	--- BREAK ---		

Time	**Topics to be discussed**	**Course material used**	**Assignments and assessment**
Week 9 Session 1 06/04/2021	Urinary and reproductive system (I) Revision questions *Digestive organs* Microclass *Urinary system*	M: p. 309-322 J: ch. 19 (intro, kidneys, renal function (only renal corpuscles + collecting ducts), figs 19-3 + 19-16) Y: Urinary system	Hand-in revision questions *Digestive organs* (J:92)
Week 9 Session 2 09/04/2021	Urinary and reproductive system (2) Revision questions *Urinary tract* Microclass *Female reproductive system* Microclass *Male reproductive system*	M: p. 368-380, 395-404 J: ch. 21 (intro, testes– until spermatogenesis, figs 21-13 + 21-15, penis) + ch. 22 (intro, ovaries– until follicular atresia, fig 22-14) Y: Reproductive system	Hand-in revision questions *Urinary tract* (J:98)
Week 10 Session 1 13/04/2021	Nervous system (I) Revision questions *Bones of pelvis, male and female reproductive system* Microclass *Nervous system*	M: p. 26-40 J: ch. 9 (introduction, neurons, central nervous system, figures 9-9, 9-21, and 9-26) Y: Nervous system	Hand-in revision questions *Bones of pelvis, male and female reproductive system* (J:104)
Week 10 Session 2 16/04/2021	Nervous system (2) Revision questions *Nervous system* Microclass *Nervous system*	M: 26-40 J: ch. 9 Y: Nervous system	Hand-in revision questions *Nervous system*
Week 11 Session 1 20/04/2021	Integument, immune and sensory organs Microclass Immune	M: 6-9, 26, 532-541, 575-589 J: ch. 14 (lymph nodes), 18 (only figures 18-1 and 18-2), 23 (only figures 23-1, 23-21, 23-28, and 23-32) Y: Skin, Immune system, sensory system	(Draft version of papers due)
Week 11 Session 2 23/04/2021	The Perfect Body Revision questions *Integument and lymph nodes*		Hand-in revision questions *Integument and lymph nodes* (J:69)
Week 12 Session 1 27/04/2021	KINGS DAY No class		
Week 12 Session 2 30/04/2021	Demonstration echo-imaging upper and lower abdomen	Guest teacher: Dr. Ali Gulam	

Time	Topics to be discussed	Course material used	Assignments and assessment
Week 13 Session 1 04/05/2021	TBD		
Week 13 Session 2 07/05/2021	Presentation of papers (part I)		Hand-in final version of papers (before 8:30)
Week 14 Session 1 11/05/2021	Presentation of papers (part 2)		
Week 14 Session 2 14/05/2021	No class, to compensate for the Field Trip Utrecht		
Week 15 Session 1 18/05/2021	Remaining questions; evaluation		
Week 15 Session 2 21/05/2021	**Final Exam**		***Final exam*** ***(see Moodle)***
Week 16 27 or 28/05/2021	Mandatory FIELD TRIP to Anatomy Lab and Museum, UMC Utrecht		***Date to be confirmed***

Explanations:
M: p. xx-xx = Moore's Essential Clinical Anatomy, pages xx-xx to study before class.
J: ch. xx-xx = Junquiera, chapter(s) xx(-xx) to study before class.
Y: xxx = Yale Histology, topic

VIII. Student learning outcomes

The course aims to reach the following objectives:

1. The student develops an attitude that is characterized by respect for the human body, and, moreover, characterized by careful and exact evaluation and judgment of all kind of conditions, manifestations, signs and symptoms of the human body.

2. The student is able to describe the morphology of the walls of the human trunk. He also knows the anatomical landmarks of the trunk and is able to outline the projections of several internal organs on the surface of the trunk, as far as is necessary to know for simple physical examination purposes.

3. The student can present a survey of normal morphology and the consequent function of organs and organ systems in the trunk. She/he is also able to describe the mutual topographic relations of these organs and organ system, as far as is necessary for the analysis and understanding of clinical problems.

4. The student knows which imaging techniques can be used to visualize internal organs of the trunk. She/he knows the basic principles of the interpretation of these images.

Measurable program outcomes	
1. Acquire knowledge/perspectives in relevant domains	X
2. Grasp relevant objectives, assumptions and values	X
3. Understand state-of-the-art knowledge	X
4. Critically review results, arguments, problem formulations	X
5. Adopt and exercise relevant academic attitudes.	X
6. Understand/apply domain knowledge in other contexts	
7. Grasp interdisciplinary issues within specialization	X
8. Develop and apply new knowledge, methods, skills and expertise.	X
9. Communicate at scholarly level	X
10. Reflect on personal/academic growth and development	
11. Master with autonomy a range of specialist topics in preparation for further academic or professional training .	
12. Function effectively in team-based projects or exercises (or individual 'command' decision exercises).	

IX. Appendices

Poster presentation

The poster presentations by the students take place on March 12 and 16, 2021. At each date, 3 posters will be presented. Each poster is prepared by a group of 4-5 students.

List of topics for posters:

1. Smoking and lung disease
2. Asthmatic lung
3. Superior vena cava syndrome
4. Carcinoma of the breast
5. Development of VSD
6. Pulmonary heart disease

The poster is supposed to be made available on Moodle, and will remain there for at least the duration of the course. The poster is supposed to hang on the virtual Moodle wall at the beginning of the class on March 12 and 16, 2021. First, all students from class will have the opportunity to read (and admire) the displayed posters. Then, each of the students from a group will present one aspect of the poster and explain the contents to his/her fellow students during approximately 20 minutes in total, followed by an Q and A session of 5-10 minutes. Students should also prepare a short written summary (max. one A4) of the poster to be handed in as hardcopy in at the start of the presentation at the latest and also via the Hand-in service on Moodle.

Main criteria for presentation: ability to convey message, depth/breath of presentation, interaction with class.

Practical instructions:
A poster is a large (about 100 - 150 cm with, or smaller) printed placard, assigned to a specific position (for example in a congress hall), often used to present the results of a scientific investigation. These results are presented on the poster in an attractive, visual, lucid and compact way. A poster must arouse the attention of passing people. Moreover, it must provoke the interest of the spectator to look at and/or read the poster carefully. Finally a good poster must have a message that provokes a desire or action of the spectator.
Making your poster you should keep in mind that the group of people you want to reach is very small. Your poster is, therefore, not a colourful, sexy and advertising billboard with only a few slogans. The group of people to whom you are addressing the poster, are your fellow students. They have some knowledge about the subject of your poster. Your poster should therefore be an invitation to a conversation or an exchange of knowledge with your fellow students. **Instructions for the online poster will be announced in class.**

Place the title of your poster in large capitals on the top space, immediately followed by the names of authors in lower-case. A poster can be built up in the same way as a scientific article: introduction, material and methods, results, discussion and conclusion. It is very important to present on the poster only the main outlines of the study. Do not try to mention all the details of your study in the poster. That causes too much written text with too small letter types. A poster must be easily readable from a distance of two meters. Use colour photographs, graphic illustrations and handmade diagrams, but do not make your poster too glossy. There should be a balance on your poster between the blocks with illustrations and blocks with text. Choose the lay-out in such a way that there is not too much background, but also not too few background visible between the text- and illustration blocks on your poster.

Paper
Write a 1500 to 2000 word persuasive paper (excluding the references) on one of the subjects listed below. The paper carries the name of the writer and starts with a summary of about 300 words. Thereafter an "introduction" is given about the subject of the paper, followed by a paragraph "materials and methods", and a paragraph "results", and finally by a paragraph "discussion". The paper closes with a list of references.
The paper must be handed-in by the student on 7th May 2021, 8:30 h at the latest (Hand-in service Moodle). Students will have the possibility to submit a draft version of their paper for comments and suggestions by the instructor. Deadline for submission of a draft version is 20th April 2021, 23:59 h (via email). Failing to hand in your final paper or scoring <50% on the paper means failing the course. Missing the deadlines means grade deduction (2% per day late). Main criteria for paper grading: structure/readability 30%, knowledge of topic/use of available literature 40% and ability to express own opinion/ideas 30%. Hand-in of your draft version via email (no paper version required).

Oral presentations of the papers is scheduled for May 7 and 11, 2021. On either one of these days the student will give to all other students a 5-minutes presentation with a summary of the paper, followed by a Q-and-A session of 2 minutes.

List of topics for anatomy paper:

1. Causes, signs and symptoms, and treatment of pneumothorax
2. Origin and treatment of oesophageal atresia in a new born child
3. Abdominal aortic aneurysm: cause, signs and symptoms, and treatment
4. Highly selective vagotomy versus gastric surgery versus pharmaceutical therapy
5. Hemodynamics in portal hypertension: surgical shunts
6. Causes, signs and symptoms, and treatment of colonic polyposis
7. Causes and treatment of enlargement of the spleen
8. Indications, execution and results of endoscopic retrograde cholangiopancreatography (ERCP)
9. Extra-uterine pregnancy: cause, diagnosis and therapy
10. Radiology of abdominal lymph nodes: indications and procedures
11. Pulmonary hypertension: diagnosis and treatment
12. Stones in kidney, ureter and bladder: causes, signs and symptoms, and treatment
13. Angina pectoris: causes, signs and symptoms, treatment
14. Diaphragmatic hernia: types, signs and symptoms, and treatment
15. Description of the various surgical approaches to the kidney
16. Partial or complete situs inversus: causes it medical problems ?
17. Anatomical variations in the blood supply of the left kidney: do they cause medical problems?
18. Hepatic cirrhosis: surgical possibilities
19. Anatomical variations of the extrahepatic bile ducts: do they cause surgical problems?
20. Coronary by-pass versus coronary angioplasty: merits and demerits
21. Anorectal malformations in new born children: genesis, and clinical problems
22. Acute abdominal pain: differential diagnosis and treatment
23. Various surgical approaches to the thoracic organs: an inventory
24. Thoracic endoscopy: indications and techniques
25. Pancreatitis: causes, signs and symptoms, and treatment
26. Pancoast tumour: causes, signs and symptoms, and treatment
27. Ring of Waldeyer
28. Other topic (to be approved)

Medical scans (depending on visit to a Radiology Department)

Imaging technology continues to advance the accuracy of diagnosis. These techniques make use of computers that have become vital tools for the radiological clinical practice. Nowadays there are many imaging techniques: ultrasonic techniques, angiographic techniques, (High-Resolution) Computed Tomography (CT), Magnetic Resonance Imaging (MRI), functional Magnetic Resonance Imaging (fMRI), Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), scintigraphy imaging. For each of these imaging techniques search for and make a concise overview of the essence of the technique, the resolution, and field of application in medicine.

During a session in the computer classroom (TBA; if possible), the students will practice in Image Interpretation - Plain X-rays of the Adult Chest: Airspace Opacification

http://exact.elfh.org.uk/exact/cppid/eXI_05_04_Opacification/last/d/ELFH_Session/7/overview.html

As the X-ray radiology, the CT and the MRI are the most commonly used radiological techniques in regional hospitals, each students is asked to collect at least three radio images (especially X-ray pictures, CT- and MRI-scans). During a field trip or during a guest lecture, the students will be introduced to the most commonly used imaging techniques.

Micro-class

A micro-class involves a short presentation (10 minutes) on one of the learning objectives from a given class in the Yale Histology course. For instance, in the Connective Tissue Lab the learning objectives are:

- Describe the structural organization of the fibres in the extracellular matrix and the cells residing within connective tissue
- Distinguish loose and dense connective tissue using the light microscope
- Contrast white and brown adipose tissue
- Describe the structure and function of cartilage
- Identify a few key pathological examples involving connective tissue

In the micro-class, one the learning objectives (e.g. the difference between white and brown adipose tissue) is dealt with. Make use of the available histological slides, as well as interactive slides.