Georg-August-Universität
Göttingen

Modulverzeichnis

Master-Studiengang "Cardiovascular Science" - referring to: Pruefungs- und Studienordnung fuer den konsekutiven Master-Studiengang "Cardiovascular Science" (Amtliche Mitteilungen I 20/2015 p. 353, zuletzt geändert durch Amtliche Mitteilungen I 65/2018 p. 1583)

Module

Übersicht nach Modulgruppen

I. Master-Studiengang "Cardiovascular Science"

To successfully complete the Master's degree programme, a total of 120 C must be earned by the following regulations.

1. Fachstudium

The following eight modules comprising 77 C have to be passed:

2. Professionalisierungsbereich

Licit modules comprising at least 13 C must be passed. Students may take modules listed in the Göttingen University’s Module Handbook of Key Competencies, whereof a maximum of 9 C can be chosen from the course offerings by the Centre for Languages and Key Competencies (ZESS) in accordance with the “Prüfungsordnung für Studienangebote der Zentralen Einrichtung für Sprachen und Schlüsselkompetenzen (ZESS) der Georg-August-Uninversität Göttingen” in its currently valid version.

3. Masterarbeit

A total of 30 C are awarded for passing the Master's thesis.

Georg-August-Universität Göttingen **Module M.CVS.001: Lab rotation I**	12 C 18 WLH

Learning outcome, core skills: The practical work will be performed in a group with an expertise in cardiovascular research under direct one-to-one supervision. By working in a research project the students will learn 1. Answering scientific questions with state-of-the-art techniques; 2. Analyzing the obtained data critically; 3. Managing time and resources in a scientific project; 4. Presenting and discussing the data in an appropriate scientific written form; 5. Presenting the data in an oral presentation.	**Workload:** Attendance time: 252 h Self-study time: 108 h

Course: Lab rotation I (Lab rotation)	17 WLH
Examination: Lab report (max. 20 pages) **Examination requirements:** Scoring of the personal performance, clarity and completeness of the lab book and the lab report (max. 20 pages). Lab report should be build up like a scientific publication containing Introduction, Materials & Methods, Results and Discussion.	10 C

Course: Lab rotation experience I (Seminar)	1 WLH
Examination: Oral Presentation (approx. 30 minutes) **Examination requirements:** Oral presentation (approx. 30 min.): PowerPoint presentation about the own lab rotation containing: short information about the institution, topic of the lab rotation, short scientific background, used methods and concluding data discussion.	2 C

Admission requirements: None	**Recommended previous knowledge:** None
Language: English	**Person responsible for module:** Prof. R. Dressel
Course frequency: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1
Maximum number of students: 25	

Additional notes and regulations:
Students can chose a topic for their “Lab rotation I” out of the “List of practical courses for M.Sc. Cardiovascular Science”.

Georg-August-Universität Göttingen **Module M.CVS.002: Lab rotation II**	12 C 18 WLH

Learning outcome, core skills: The practical work will be performed in a group with an expertise in cardiovascular research under direct one-to-one supervision. By working in a research project the students will learn 1. Answering scientific questions with state-of-the-art techniques; 2. Analyzing the obtained data critically; 3. Managing time and resources in a scientific project; 4. Presenting and discussing the data in an appropriate scientific written form; 5. Presenting the data in an oral presentation.	**Workload:** Attendance time: 252 h Self-study time: 108 h

Course: Lab rotation II (Lab rotation)	17 WLH
Examination: Lab report (max. 20 pages) **Examination requirements:** Scoring of the personal performance, clarity and completeness of the lab book and the lab report (max. 20 pages). Lab report should be build up like a scientific publication containing Introduction, Materials & Methods, Results and Discussion.	10 C

Course: Lab rotation experience II (Seminar)	1 WLH
Examination: Oral Presentation (approx. 30 minutes) **Examination requirements:** Oral presentation (approx. 30 min.): PowerPoint presentation about the own lab rotation containing: short information about the institution, topic of the lab rotation, short scientific background, used methods and concluding data discussion.	2 C

Admission requirements: None	**Recommended previous knowledge:** None
Language: English	**Person responsible for module:** Prof. R. Dressel
Course frequency: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 2
Maximum number of students: 25	

Additional notes and regulations:
Students can chose a topic for their “Lab rotation II” out of the “List of practical courses for M.Sc. Cardiovascular Science”
Lab rotation II has to be done in another lab than Lab rotation I.
Both rotations should differ in the used methods.

Georg-August-Universität Göttingen **Module M.CVS.003: Lab rotation III**	11 C 17 WLH

Learning outcome, core skills: The practical work will be performed in a group with an expertise in cardiovascular research under direct one-to-one supervision. By working in a research project the students will learn 1. Answering scientific questions with state-of-the-art techniques 2. Analyzing the obtained data critically 3. Managing time and resources in a scientific project 4. Presenting and discussing the data in an appropriate scientific written form	**Workload:** Attendance time: 238 h Self-study time: 92 h

Course: Lab rotation III (Lab rotation)	17 WLH
Examination: Lab report (max. 20 pages) **Examination requirements:** Scoring of the personal performance, clarity and completeness of the lab book and the lab report (max. 20 pages). Lab report should be build up like a scientific publication containing Introduction, Materials & Methods, Results and Discussion.	11 C

Admission requirements: None	**Recommended previous knowledge:** None
Language: English	**Person responsible for module:** Prof. R. Dressel
Course frequency: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 3
Maximum number of students: 25	

Additional notes and regulations:
Students can chose a topic for their “Lab rotation III” out of the “List of practical courses for M.Sc. Cardiovascular Science”
Lab rotation III has to be done in another lab than Lab rotation I and II.
All rotations should differ in the used methods.

Georg-August-Universität Göttingen **Module M.CVS.004: Modern topics in CVS and clinical research**	6 C 5 WLH

Learning outcome, core skills:	**Workload:**
This course integrates the training and attendance of the presentations of recent publications in the cardiovascular field. Students who successfully finished this module have learnt to present and critically discuss scientific topics. In addition, the students will learn to design follow-up research projects to the presented topics.	Attendance time: 70 h Self-study time: 110 h

Course: Monday meeting (Seminar) *Contents*: • Attendance of scientific presentations • Active presentation of recent publications of the field • Design of a potential research project	5 WLH
Examination: Learning journal (max. 20 pages) **Examination requirements:** Portfolio (contains summaries of the presented research topics with a maximum of 1 page per topic)	6 C

Admission requirements: None	**Recommended previous knowledge:** None
Language: English	**Person responsible for module:** Dr. Christina Würtz
Course frequency: each semester	**Duration:** 3 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1 - 3
Maximum number of students: 25	

Additional notes and regulations:

Teaching capacity provided by:

Med-VK: -; Med-KT: 70h seminar; Med.-K: -

Georg-August-Universität Göttingen **Module M.CVS.101: Cardiovascular basics I**	9 C 7 WLH

Learning outcome, core skills: Students who have successfully finished this module have an advanced knowledge of: 1. The anatomy of the heart, the vasculature, the lung, the kidney, the nervous system of humans, rodents and widely used experimental animals (e.g. zebra fish); 2. The embryonic development in general and of the cardiovascular system; 3. The physiology of the heart, the circulation, the lung, the kidney, the autonomous nervous system including e.g. detailed knowledge on the control of cardiac contractility and function, the short and long term control of the blood pressure, important hemodynamic laws; 4. The hormonal control of the cardiovascular system e.g. by catecholamines, the RAAS, natriuretic peptides, sex hormones.	**Workload:** Attendance time: 98 h Self-study time: 172 h

Course: Cardiovascular basics I (Lecture) *Contents*: • Cardiovascular Anatomy • Cardiovascular Physiology • Cardiovascular Embryology • Cardiovascular Nervous System • Cardiovascular Endocrinology	5 WLH
Examination: Written examination (180 minutes) **Examination requirements:** Written exam (180 min) about the development, physiology and anatomy of the heart and the cardiovascular system and its hormonal and nervous regulation.	7 C

Course: Cardiovascular basics I (Practical course) *Contents*: • The cardiovascular anatomy • Histology course of cardiovascular tissues • Cardiovascular Physiology	2 WLH
Examination: Oral Presentation (approx. 15 minutes), not graded **Examination requirements:** Short PowerPoint presentation about a given topic, including max. 5 minutes discussion.	2 C

Admission requirements: None	**Recommended previous knowledge:** None
Language: English	**Person responsible for module:** Dr. L. Zelarayan-Behrend
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1

Maximum number of students: 25	

Additional notes and regulations:

Teaching capacity provided by:

Med-VK: 54h lecture, 28h practical work; Med-KT: 16h lecture; Med.-K:-

Georg-August-Universität Göttingen **Module M.CVS.102: Cardiovascular basics II**	9 C 7 WLH

Learning outcome, core skills: Students who have successfully finished this module have an advanced knowledge of: 1. The detailed structure of eukaryotic cells and especially of cardiovascular cells including cardiomyocytes, smooth muscle cells, endothelial cells, fibroblasts, epithelial cells, stem cells; 2. Important cellular processes e.g. proliferation, migration, contraction, apoptosis, necrosis; 3. Intracellular mechanisms e.g. transcription, translation, PTM, exo/endocytosis, protein degradation; 4. The regulation of action potentials, ion fluxes, transporters; 5. Thermodynamics, hydrodynamics, biomechanics; 6. The cellular metabolism including glucose, fatty acid and amino acid metabolism 7. Protein composition and structures; 8. The genetic and epigenetic control of protein expression including the DNA architecture, replication, transcription, DNA modifications, histon modifications; 9. Import concepts of signal transduction including membrane and intracellular receptor-dependent signaling involving e.g. kinases-phosphatases, G proteins, second messengers, transcription factors, oxygen and redox signaling.	**Workload:** Attendance time: 98 h Self-study time: 172 h

Course: Cardiovascular basics II (Lecture) *Contents*: • Cardiovascular cell biology • Cardiovascular biophysics • Cardiovascular biochemistry • Cardiovascular (epi)genetic • Cardiovascular signal transduction	6 WLH
Examination: Written examination (180 minutes) **Examination requirements:** Written exam (180 min) about the function of different sources of cell types, important biochemical and biophysical cellular processes, signal transduction processes in the heart and basics of (epi)genetics	7 C

Course: Cardiovascular basics II (Seminar) *Contents*: Presentation of recent publications from the cardiovascular field.	1 WLH
Examination: Oral Presentation (approx. 15 minutes) **Examination requirements:** Seminar presentation (oral, approx. 15 min.): Short PowerPoint presentation about a given topic, including approx. 5 minutes discussion	2 C

Admission requirements:	**Recommended previous knowledge:**
None	Passed examination in module M.CVS.101

Language: English	**Person responsible for module:** Dr. K. Streckfuß-Bömeke
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1
Maximum number of students: 25	

Additional notes and regulations:

Teaching capacity provided by:

Med-VK: 20h lecture, 4h seminar; Med-KT: 30h lecture, 6h seminar; Med.-K: 34h, 4h seminar

Georg-August-Universität Göttingen **Module M.CVS.201: Cardiovascular diseases and therapies**	9 C 6 WLH

Learning outcome, core skills: Students who have successfully finished this module have an advanced knowledge of: 1. Etiology and pathophysiology, signs and symptoms, diagnosis, classifications, management, prognosis of important cardiovascular diseases including e.g. coronary artery disease, load-dependent heart diseases, cardiomyopathies, myocarditis, pulmonary heart diseases (PAH and COPD), arrhythmia and their outcomes e.g. myocardial infarction, stroke, left and right heart failure; 2. Risk factors for heart diseases including diabetes, hypertension, metabolic syndrome; 3. Important molecular causes for cardiovascular diseases including involved gene mutations and disease-dependent molecular changes; 4. Important technologies in cardiovascular imaging including echocardiography, computed tomography, magnetic resonance imaging; 5. Treatment strategies and basic pharmacological principles including pharmacodynamics, pharmacokinetics, interference with the catecholamine, acetylcholine and RAA systems, diuretics, anti-arrhythmic drugs, vasodilators, lipid-lowering drugs, anti-thrombotic drugs, anti-diabetic drugs; 6. Modern (experimental) therapeutic approaches including gene therapy, cell-based therapy, tissue regeneration; 7. Interventional therapies including coronary catheterization, stent implantation; 8. Cardiac surgeries of acquired heart diseases, of the vasculature and congenital heart defects including heart and valve transplantation, by-pass surgery.	**Workload:** Attendance time: 84 h Self-study time: 186 h

Course: Cardiovascular diseases and therapies (Lecture) *Contents*: • Clinical and molecular aspects of cardiovascular diseases in adults and children • Cardiovascular imaging • Interventional therapies • Cardiovascular surgery • Cardiovascular pharmacology	5 WLH
Examination: Written examination (180 minutes) **Examination requirements:** Written exam (180 min) the diagnosis of cardiovascular diseases via imaging and their pharmacological and interventional therapies, clinical aspects of cardiovascular diseases in adults and children	7 C

Course: Cardiovascular diseases and therapies (Practical course) *Contents*: • ECG reading • Case studies	1 WLH
Examination: Oral Presentation (approx. 15 minutes), not graded **Examination requirements:**	2 C

Short PowerPoint presentation about a given topic, including max. 5 minutes discussion.	

Admission requirements: None	**Recommended previous knowledge:** Passed examination in module M.CVS.101 and M.CVS.102
Language: English	**Person responsible for module:** Prof. Susanne Lutz
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 2
Maximum number of students: 25	

Additional notes and regulations:

Teaching capacity provided by:

Med-VK: -; Med-KT: 28h lecture; Med.-K: 56h lecture, 14h practical work

Georg-August-Universität Göttingen **Module M.CVS.301: Cardiovascular research in academia and industry**	9 C 7 WLH

Learning outcome, core skills: Students who have successfully finished this module have an advanced knowledge of: 1. Specified topics of current cardiovascular research; 2. State of the art methodology in cardiovascular research including e.g. animal models, imaging techniques, high throughput technologies, stem cell-based research, tissue engineering, system biology; 3. Biostatistics; 4. Research standards in industry; 5. The design and management of clinical trials.	**Workload:** Attendance time: 98 h Self-study time: 172 h

Course: Cardiovascular research in academia and industry (Lecture) *Contents*: • Scientific Aspects of cardiovascular diseases • State-of-the art research methods • Biostatistics • Design and management of clinical trials • Insights in research in industry	6 WLH
Examination: Written examination (180 minutes) **Examination requirements:** Written exam (180 min) basics of biostatistical methods and the management and design of clinical trials, different state-of-the-art methods and high throughput technologies in cardiovascular research	7 C

Course: Cardiovascular research in academia and industry (Seminar) *Contents*: Presentation of recent publications from the cardiovascular field.	1 WLH
Examination: Oral Presentation (approx. 15 minutes) **Examination requirements:** Seminar presentation (oral, approx. 15 min.): Short PowerPoint presentation about a given topic, including approx. 5 minutes discussion	2 C

Admission requirements: None	**Recommended previous knowledge:** Passed examinations in modules M.CVS.101, M.CVS.102 and M.CVS.201
Language: English	**Person responsible for module:** Prof. Thomas Meyer
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 3

Maximum number of students: 25	

Additional notes and regulations:

Teaching capacity provided by:

Med-VK: 10h lecture; Med-KT: 32h lecture, 10h seminar; Med.-K: 42h lecture, 4h seminar