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EF0001 Family Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	5.00	25.5

Description of coursework and examinations:

The course consists of:

1. Lecture Family Medicine
2. Peer Teaching Basic Medical Examination

The lecture deals with important consultation issues and care situations in the family practice and explores these with the students. The focus is on learning practical skills (e.g. subcutaneous infusion, basic geriatric assessment), in addition the general medical line of action plays an important role (red flags vs test of time, etc.).

In the Peer Teaching Basic Medical Examination, students will practice basic examinations under the guidance of student tutors who are doing their Medical Internship.

In the third academic year of clinical studies, the basics learned will be applied in everyday practice as part of a block internship.

Examination requirements lecture

- Attendance record
- Written exam (MC, 20 questions, 30 min) Examination requirements Peer Teaching Basic Medical

Examination:

- Attendance record
- OSCE in the following semester

Intended learning outcomes:

Seminar lecture:

Dimension: 1. Knowledge 2. Skills 3. Attitude

Level of competence 1. Factual knowledge 2. Practical and causal knowledge 3. Capacity to take competent action

Peer Teaching Basic Medical Examination:

The student must be able to independently perform a standardized examination on a patient

Contents:

Seminar lecture:

Seminar 1: Acute and chronic diseases, chest pain, diabetes, common cold and shortness of breath

Seminar 2: Preventive Medicine, back pain, addiction, quaternary prevention

Seminar 3: Special situations, multidrug therapy, geriatric patients, palliative care medicine

Peer Teaching Basic Medical Examination:

Basic cardiopulmonary examination, basic abdominal examination, basic ophthalmologic examination, basic ENT examination, basic orthopedic and neurological examination.

Teaching and learning method:

Seminar lecture: Seminar with practical exercises (3 x 3,5h per semester on Wednesdays). Small groups of 8-12 students instructed by 1-2 physician lecturers. Teaching material for this event on mediTUM.

Peer Teaching Basic Medical Examination: practical exercise module (12 x 1,5h per semester on Tuesdays and Fridays). Small groups of 3 students each instructed by one MI (Medical Internship) student. Teaching material for this event on mediTUM.

EF0003 Occupational and Social Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	16.5

Description of coursework and examinations:

The lecture covers the essentials of Occupational Safety and Health for medical practice and the impact of professional activities on health. It addresses the legal framework in Germany, the roles and duties of a medical officer, the classification and reporting of occupational diseases, and the prevention and treatment of work-related illnesses. Other topics include the differences between Occupational Health and Environmental Medicine, ethical considerations and the importance of psychosocial stress in the workplace.

Examination: Written exam at the end of the semester

Intended learning outcomes:

After completing the lecture "Occupational and Social Medicine", students should have mastered the fundamentals of Occupational Health and Safety, be able to apply diagnostic procedures in Occupational Medicine, know the legal aspects of Health and Safety and be able to implement preventive and rehabilitative measures in professional environments. They are to recognize and treat work-related diseases and understand how to prevent them.

Contents:

Fundamentals of Occupational Safety and Health for medical practice

- Concept of stress and strain
 - Legal foundations of Occupational Health and Safety in Germany
 - Tasks of a Medical Officer: work anamnesis and risk assessment
 - Hierarchy of Occupational Health and Safety measures
 - Definition and legal treatment of occupational accidents and diseases
 - Reporting obligation for suspected occupational diseases
 - Similarities and differences of Occupational Health and Environmental Medicine
 - Fundamentals of the ethical aspects of the interplay between work and health
- Occupational Medicine in Health Services
- Risk assessment health service
 - Blood-borne infectious diseases
 - Needlestick injuries
 - Aerogen infectious diseases
 - Occupational health and safety measures
 - Occupational medical precautions in health services
 - Vaccine indications
 - Skin exposure in health services
 - Maternity leave

Work-related respiratory diseases

- Fundamentals of pulmonary function testing
- Allergic respiratory diseases
- Irritant-toxic respiratory diseases
- Diagnosis of occupational asthma
- Risk factors and prognosis of occupational asthma
- Chronic obstructive bronchitis or emphysema caused by occupational exposure

Noise at the workplace

- Effect of noise on the human ear
- Measurement of noise
- Noise reduction and prevention
- Ear protection
- Noise-induced hearing loss as occupational disease
- Extra-auditory effects of noise on humans

Chemicals the workplace

- Biomonitoring
- Evaluation of measured values
- Reference values
- Occupational exposure limit values

- Heavy metals (lead, mercury, et al.)
- Organic substances (benzene, hexane, PCB, polycyclic aromatic hydrocarbons, aromatic amines, et al.)

Work-related skin diseases

- UV exposure
- Chemical skin damage
- Travel dermatology
- Allergy diagnostics
- Skin eczema, dermatologic procedures

Work-related cancers

- Pulmonary carcinogens
- Occupational diseases caused by silicogenic dust
- Occupational diseases caused by asbestos dust
- Occupational cancers of the upper respiratory tract, the hematopoietic system, the urinary tract and other organ systems

Psychosocial stress and strain at the workplace

- Concept of stress and strain in the psychosocial context
- Individual and structural prevention
- Psychological characteristics of work
- Requirements models (e.g. model of job characteristics, complete tasks)
- Resource models (e.g. demand-control-model, effort-reward-imbalance, social support)
- Stress models (e.g. workplace barriers, interruptions)
- Diagnostic findings regarding the effects of working conditions on mental and physical health

Health and performance

- Specific conditions and consequences: leadership, burnout
- Mobbing

Work-related physical illnesses

- Vibration, shock (circulatory disturbances, degenerative joint diseases)
- Lifting and carrying heavy loads (intervertebral disc)
- Pressure (meniscus, bursa, nerves)
- Mechanical strain (tendon sheaths, carpal tunnel syndrome)
- Gonarthrosis as a work-related disease
- Musicians dystonia
- Ergonomic workplace design
- Diseases caused by working in pressurized air
- Diseases caused by ionizing radiation

Antibiotic resistance

- Intake of antibiotics and antibiotic resistance
- Antibiotic resistance in the environment and at the workplace
- Antibiotic resistance in wastewater
- Study designs to assess antibiotic resistance

Social Medicine

- Social security system in Germany
- Key concepts of the welfare state
- Fundamentals of rehabilitation
- Statutory rehabilitation authorities
- Benefits for participation in employment
- Informal work
- Occupational accidents
- ICF: International Classification of Functioning, Disability and Health

Teaching and learning method:

Lecture. The teaching materials are available to students on mediTUM.

EF0004 Ophthalmology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.50	29

Description of coursework and examinations:

The course consists of:

1. Main lecture Ophthalmology (1st academic year)
2. Block internship Ophthalmology (2nd academic year)

Examination of the lecture: Written exam at the end of the semester with 30 MC questions (minimum passing score 60%), repetition one semester later.

Examination of the block internship: Final practical test at the end of the block internship, repeat examination during the next block internship.

Intended learning outcomes:

After completing the lecture and the block internship, students should have acquired fundamental knowledge of Ophthalmology, including the anatomy of the eye, the diagnosis and treatment of common eye diseases and the ability to perform basic methods of ophthalmic examination. They will be able to recognize and interpret clinical symptoms and take the appropriate diagnostic steps.

Contents:

1. Lecture topics:

- o Introduction to Anatomy
- o Acute visual impairments
- o Reddening of the eye
- o Glaucoma
- o Pediatric ophthalmology
- o Lids and lacrimal system
- o Retina I (diabetes, vascular occlusion)
- o Retina II (macular degeneration, ablation)
- o Strabismus
- o Visual acuity, refractive surgery, cataracts

2. Block internship topics:

Over two days, the participants are divided into groups and complete 12 practical units in succession:

- o Medical history, main symptoms
- o Basic diagnostics and treatment
- o Field of vision
- o Glaucoma fundamentals
- o Advanced functional diagnostics
- o Ocular emergencies
- o Operating theater
- o Orthoptics
- o Slit lamp
- o "Mirror course" ophthalmology Part 1
- o "Mirror course" ophthalmology Part 2
- o Visual acuity + refraction

Teaching and learning method:

Lecture and practical course providing hands-on training of examination methods. The teaching materials are available to students on mediTUM.

EF0006 Dermatology, Venerology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	5.00	38

Description of coursework and examinations:

The course consists of a lecture, a seminar/bedside course and an internship day.

1. Lecture: 22 h (double lessons) every semester, 2nd academic year
2. Seminar: flipped classroom format, also includes bedside teaching (9x1h) every semester, 2nd academic year
3. Internship day: 7 h every semester, 3rd academic year

Examination: Written exam at the end of the lecture in the 2nd academic year: 40 MC questions

Intended learning outcomes:

After completing the course, students should have acquired comprehensive knowledge of the most common dermatological diseases and their treatment. They will be able to recognize skin diseases based on their clinical presentation and understand and apply the necessary diagnostic and therapeutic steps. They will also develop practical skills in conducting dermatological examinations and patient care in both outpatient and inpatient contexts.

Contents:

1. Lecture topics:

- Introduction, parasites and viruses
- Mycology, bacterial dermatoses, Venereology
- Benign tumors and important genodermatoses
- Non-melanocytic skin tumors - dermatosurgery
- Melanocytic nevi and malignant melanoma
- Autoimmune diseases
- Allergy, urticaria, anaphalaxia
- Psoriasis and lichen ruber
- Atopic eczema (neurodermatitis)
- Eczema, contact allergy, occupational dermatoses
- Dermatotherapy

2. Seminar

Concept/contents

Bedside teaching for 1 to 2 people (subject-related) + structured lessons on the following topics:

- Acne
- Allergies
- Atopic eczema
- Autoimmune diseases
- Erythematous-squamous diseases
- Infectious diseases/STD
- Pediatric Dermatology
- Melanoma/white skin cancer
- Photo-dermatology

3. Internship day:

Concept/contents:

Half-day shadowing in an outpatient clinic or on the ward, half-day structured lessons with case presentation.

Teaching and learning method:

Lecture and practical course providing hands-on training in examination methods. Seminar with bedside teaching. The teaching materials are available on mediTUM.

EF0007 Gynecology and Obstetrics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.50	24

Description of coursework and examinations:

The course covers theoretical knowledge in Gynecology and Obstetrics.

Main lecture (11x 1.5h) + seminar (5x1.5h) in the 2nd clinical academic year.

Examination: Written exam Gynecology and Obstetrics at the end of the lecture/seminar semester 40 MC questions (minimum passing score 60%), repetition in the following semester

Intended learning outcomes:

Students should develop a profound understanding of the essential aspects of Gynecology and Obstetrics. They will be able to recognize and respond appropriately to emergencies in these fields, understand and attend to normal and abnormal pregnancy and childbirth, and be familiar with common gynecological diseases and their treatments.

Contents:

1. Lecture content

- Emergencies in Gynecology and Obstetrics
- Course of pregnancy, prenatal diagnostics, maternity guidelines
- The normal delivery
- The irregular delivery
- Emergencies in Obstetrics
- Ectopic pregnancy
- Miscarriage and termination of pregnancy
- Hypertensive disorders during pregnancy
- Diabetes in pregnancy
- Benign neoplasms in the genital region: myomas, polyps
- Dysfunction of the pelvic floor and bladder, Urogynecology
- Breast cancer
- Ovarian cancer
- Vulvar cancer and trophoblastic tumors
- Cervical and endometrial cancer

2. Seminar contents

- Emergencies in Gynecology and Obstetrics
- Prenatal diagnosis, prenatal care
- Menstrual cycle, phases of woman's life, contraception
- Endometriosis and sterility
- Radiotherapy

Teaching and learning method:

Lecture and seminar. The teaching materials are available to students on mediTUM.

EF0008 Otolaryngology (Ear, nose and throat - ENT)

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.5	27

Description of coursework and examinations:

Components: Lecture, ENT examination course, ENT internship days.

The course combines theoretical lectures with practical study sessions and internship days to establish a fundamental understanding of diseases of the ear, nose and throat.

Examination: Written MC exam at end of the semester.

Intended learning outcomes:

After completing this course, students should understand the anatomical and physiological fundamentals of the ENT field and be able to safely perform basic diagnostic procedures such as otoscopy and audiometry. They will be able to recognize and understand conditions affecting the auditory and vestibular organs, voice, speech and swallowing, and be familiar with therapeutic approaches and preventive measures.

Contents:

Lecture:

- Hearing and the inner ear
- Outer ear and middle ear
- Voice, speech and swallowing
- Balance
- Sleep
- Oral cavity and pharynx
- Salivary glands
- Hypopharynx and larynx
- Allergology and nose
- Throat

Study Session:

- Instructions for performing otoscopy to examine the outer ear and eardrum
- Learning to perform audiometric tests to assess hearing ability
- Practical exercises to examine the vestibular system
- Diagnostics and treatments for voice, speech and swallowing disorders
- Performing a nasal endoscopy to assess the nasal cavity and paranasal sinuses
- Use of laryngoscopy to visualize the larynx and hypopharynx

Teaching and learning method:

Lecture and practical exercises as part of the study session and the internship days providing hands-on experience with examination methods. The teaching materials are available to students on mediTUM.

EF0011 Internal Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	16.00	150

Description of coursework and examinations:

There are several important interdisciplinary lectures, called Interdisciplinary Lectures (IVL).

Lectures:

- Interdisciplinary Lecture 1 (IVL 1) (winter semester only)
- Interdisciplinary Lecture 2.1 (IVL 2.1) (summer semester only)
- Interdisciplinary Lecture 2.2 (IVL 2.2) (winter semester only)
- Interdisciplinary Lecture 2.3 (IVL 2.3) (summer semester only)
- Interdisciplinary Lecture 3 (IVL 3) (winter and summer semester)

All interdisciplinary lectures deal with Internal Medicine, with IVL 1 covering Clinical Pathophysiology. The contents of IVL 2.1 and 2.2, as well as the examination, include surgery and specific pathology.

Practical exercise modules:

Course on medical history and physical examination: Skilltraining Internal Medicine (examination techniques)

Students learn how to obtain a correct medical history and perform a physical examination.

Bedside Teaching: Students learn how to do anamnesis and physical examination, and the cases will be discussed with the department doctors.

Examination:

Lecture: IVL-written exam at the end of the semester with MC questions, repetition one semester later

Intended learning outcomes:

Specific examination techniques in Internal Medicine:

Overall learning objectives:

- Students should independently perform a standardized examination of vital signs, the cardiovascular system, the thorax, the abdomen and the vascular system on a patient at least once and be able to recognize significant pathological findings.
- The student should develop a professional approach to patients when performing a physical examination.
- The student should be able to write up and present the findings of the physical examination. Specific learning objectives:
 - Knowledge: Knowledge of the examination techniques and pathological findings (heart failure, issues with the mitral and aortic valve, emphysema, pleural effusion, pneumonia, pulmonary congestion, obstruction, pneumothorax, atelectasis, ascites, acute abdomen, jaundice, hepatosplenomegaly, PAD, venous insufficiency, leg vein thrombosis).
 - Skills: Assessment of venous pressure and precordial positions, auscultation of the heart (heart sounds, heart murmurs), inspection (constitutional type, cyanosis, caput medusae, respiratory movements, deformation), palpation (respiratory movements), percussion (movements of the organs when breathing, attenuation, effusion) and auscultation (respiratory sounds, bronchophony; secondary sounds, crackling sounds, pleural friction rub) of the thorax, vocal fremitus, examination of the abdomen (changes in shape, hairiness, exanthema, visible vessels, scarring, hernias). Palpation (peritonism, resistance, pulsation of the aorta, liver, spleen, gall bladder), percussion (liver edge, liver-lung border, bladder, stomach) and auscultation of the abdomen (vascular and bowel sounds), examination of the arterial and venous vascular system, measuring blood pressure, Ratschow tests, palpation of lymph nodes, spleen. Tumors
 - Attitude: The student should explain to the patient which examinations are being performed and encourage the patient to cooperate. The aim is to teach the bedside manner of a doctor including the corresponding consideration, empathy and the necessary interest in obtaining findings.

Bedside course:

Cardiology/ Pulmonology: At the end of the bedside course, students are expected to know the following clinical pictures: Aortic stenosis, heart failure, pulmonary embolism, pneumonia, COPD and PAOD. He or she should be able to establish the clinical diagnosis, be familiar with the examination findings and be able to devise a treatment plan.

• Knowledge:

- o Students should be able to interpret the pathological findings in the case of the cardiac diseases heart failure, mitral valve insufficiency, aortic stenosis and the pulmonary diseases pulmonary embolism, pneumonia, COPD based on the medical history and physical examination.
- o Students should understand the relevant etiology and pathology of myocardial pump failure, vitia, pericardial tamponade, dysrhythmias, left and right heart failure, rheumatic/degenerative aortic stenosis, pressure and volume loading in the left ventricle, pulmonary hypertension, pulmonary embolism, arteriosclerosis, post-stent ischemia and necrosis, thrombophilia, venous flow obstructions, breathing mechanics, respiratory insufficiency, pulmonary edema, pleural effusion and pneumonia.
- o Students should be able to name the diagnostic procedures ECG, X-ray, CT, MR, echocardiography, duplex sonography, cardiac catheterization, bronchoscopy, microbiological examinations and laboratory diagnostics and their pathological findings for these cardiac and pulmonary diseases.
- o Students should be able to name the acute treatment and chronic treatment with medication of these cardiac and pulmonary diseases and explain the underlying therapeutic principles.
- o Students should be able to name the non-pharmacological therapies for these cardiac and pulmonary diseases.

• Skills:

- o Medical history: When taking the medical history, the student actively inquires about cardiac and pulmonary symptoms: Shortness of breath, angina pectoris, edema, nocturia, cyanosis, palpitations, syncope, dizziness, rheumatic fever, general symptoms, claudication, risk factors, swelling of the extremities, pain, redness, overheating, feeling cold, paresthesia, cough, phlegm, fever
- o Examination: Students should be able to independently perform a focused, standardized examination of a patient's vital signs, cardiovascular and pulmonary systems (heart murmurs, heart rate, stasis in the jugular vein, respiratory sounds, lung palpitation, pulse, liver and spleen palpation, bowel sounds, edema).
- o Students should have seen a patient with the above-mentioned cardiac and pulmonary diseases at least once during the bedside course.
- o Students should be able to independently request relevant diagnostic examinations for the above-mentioned cardiac and pulmonary diseases (see above).
- o Students should have interpreted the pathological diagnostic findings of at least one patient with the above-mentioned diseases.
- o Students should have developed a treatment plan for a patient with the above-mentioned diseases at least once.

- Attitude:

- o When taking the medical history and examining the patient, students should demonstrate a confident and professional approach and be considerate of the patient.
- o Students should address the concerns of the acutely ill patient and be able to explain diagnostic and therapeutic measures to the patient.

Hemato-Oncology: At the end of the bedside course, students are expected to know the following clinical pictures: Be able to clinically diagnose anemia, leukemia, bronchial carcinoma, lymphoma, chemotherapy, infections and neutropenic fever and know the examination findings and design a treatment plan for these conditions.

- Knowledge:

- o Students should be able to interpret the pathological findings from medical history and physical examination related to the following hematological and oncological diseases: Anemia, leukemia, bronchial carcinoma, lymphoma, chemotherapy, infections and neutropenic fever.
- o Students should be able to explain the relevant etiology and pathology of hematopoiesis, leukocytopoiesis and thrombopoiesis, blood coagulation and hemostasis, innate and natural immunity, complications resulting from infections caused by immunological factors, infections in immunodeficiencies and bronchial carcinoma.
- o Students should be able to name the diagnostic procedures X-ray, bone marrow examination, biopsy, CT, MR, microbiology, sonography, scintigraphy, gastroscopy, bronchoscopy, thoracoscopy and laboratory diagnostics and their pathological findings for these hematological and oncological diseases.
- o Students should be able to name the acute treatment and chronic treatment with medication of these hematological and oncological diseases and explain the underlying therapeutic principles.
- o Students should be able to name the non-pharmacological therapies for these hematological and oncological diseases.

- Skills:

- o Medical history: When taking the medical history, the student actively inquires about hematological and oncological symptoms: General symptoms, pain, fever, weight changes, pruritus, anemia, nausea, vomiting, diarrhea, polyuria, dysuria, edema, medication, past infection, underlying diseases, joint pain, shortness of breath, cyanosis, cough, phlegm, hemoptysis, bone pain, dizziness, syncope, paresthesia, neurological impairment and susceptibility to infection.
- o Examination: Students should be able to independently perform a focused, standardized examination of a patient's hematological and oncological system (palpation of lymph nodes, liver, spleen, ascites, auscultation and percussion of the lungs and heart, bowel sounds, edema, cyanosis, jaundice, stasis in the jugular vein).
- o Students should have seen a patient with the above-mentioned hematological and oncological diseases at least once during the bedside course.
- o Students should be able to independently request relevant diagnostic examinations for the above-mentioned hematological and oncological diseases (see above).
- o Students should have interpreted pathological diagnostic findings of at least one patient with the above-mentioned hematological and oncological diseases.
- o Students should have developed a treatment plan for a patient with the above-mentioned hematological and oncological diseases at least once.

- Attitude:

o When taking the medical history and examining the patient, students should demonstrate a confident and professional approach and be considerate of the patient. Students should address the concerns of the acutely ill patient and be able to explain diagnostic and therapeutic measures to the patient.

Gastroenterology: At the end of the bedside course, the student is expected to know the following clinical pictures: Be able to clinically diagnose gastritis/ulcerative diseases, diarrhea, colon cancer, stomach cancer, pancreatitis, hepatitis, cholecystitis, cirrhosis and know the examination findings and design a treatment plan for these conditions.

• Knowledge:

Students should be able to interpret the pathological findings in gastrointestinal diseases such as gastritis/ulcerative diseases, diarrhea, colon cancer, stomach cancer, pancreatitis, hepatitis, cholecystitis, cirrhosis based on the medical history and physical examination.

Students should be able to explain the relevant etiology and pathology of dysphagia, regurgitation, regulation of gastric secretion and gastric motility, acute and chronic gastritis, symptoms associated with postgastrectomy, resorption and secretory processes, diarrhea, constipation, chronic inflammatory bowel disease, tumors of the gastrointestinal tract, hepatocellular functions, portal hypertension, gallstone formation, acute and chronic cholecystitis, pancreatitis and hepatitis.

o Students should be able to name the diagnostic procedures X-ray, endoscopy, biopsy, manometry, esophageal pH test, breath test, CT, MR, microbiology, sonography and laboratory diagnostics and their pathological findings in these gastrointestinal diseases.

o Students should be able to name the acute treatment and chronic treatment with medication of these gastrointestinal diseases and explain the underlying therapeutic principles.

o Students should be able to name the non-pharmacological therapies for these gastrointestinal diseases.

• Skills:

o Medical history: When taking the medical history, the student actively inquires about gastrointestinal symptoms: pain, nausea, vomiting, loss of appetite, weight loss, heartburn, dysphagia, cough, constipation, diarrhea, meteorism, fever, ascites, jaundice, facial flushing and signs of liver disease.

o Examination: Students should be able to independently perform a focused, standardized examination of a patient's gastrointestinal system (inspection, palpation of liver and spleen, auscultation, ascites examination, rectal examination).

o Students should have seen a patient with the above-mentioned gastrointestinal diseases at least once during the bedside course.

o Students should be able to independently request relevant diagnostic examinations for the above-mentioned gastrointestinal diseases (see above).

o Students should have interpreted pathological diagnostic findings of at least one patient with the above-mentioned gastrointestinal diseases.

o Students should have developed a treatment plan for a patient with the above-mentioned gastrointestinal diseases at least once.

• Attitude:

o When taking the medical history and examining the patient, students should demonstrate a confident and professional approach and be considerate of the patient.

o Students should address the concerns of the acutely ill patient and be able to explain diagnostic and therapeutic measures to the patient.

Nephrology & Endocrinology: At the end of the bedside course, the student is expected to know the following clinical pictures: renal insufficiency, diabetes mellitus, hypertension and hyperparathyroidism. He or she should be able to establish the clinical diagnosis, be familiar with the examination findings and be able to devise a treatment plan.

• Knowledge:

o Students should be able to interpret the pathological findings in the case of the nephrological and endocrinological diseases renal insufficiency, diabetes mellitus, hypertension and hyperparathyroidism based on the medical history and physical examination.

o Students should be able to explain the relevant etiology and pathology of renal insufficiency in renovascular diseases, glomerulonephritis, systemic diseases, drug abuse, diabetes mellitus, polycystic kidney diseases, causes, complications and manifestations of diabetes mellitus, hypertension and hyperparathyroidism.

o Students should be able to name the diagnostic procedures X-ray, biopsy, CT, MR, microbiology, sonography, scintigraphy and laboratory diagnostics including urine diagnostics and provocation tests and their pathological findings for these these nephrological and endocrinological diseases.

o Students should be able to name the acute treatment and chronic treatment with medication of these nephrological and endocrinological diseases and explain the underlying therapeutic principles.

o Students should be able to name the non-pharmacological therapies for these nephrological and endocrinological diseases.

•Skills:

o Medical history: When taking the medical history, the student actively inquires about nephrological and endocrinological symptoms: general symptoms, weight changes, pruritus, anemia, nausea, vomiting, diarrhea, polyuria, dysuria, hematuria, edema, medication, past infection, underlying diseases, joint pain, vasculitis, hemoptysis, bone pain, dizziness, syncope, and susceptibility to infection.

o Examination: Students should be able to independently perform a focused standardized examination of a patient's nephrological and endocrinological system (blood pressure, edema, bruit, lung congestion, paleness).

o Students should have seen a patient with the above-mentioned nephrological and endocrinological diseases at least once during the bedside course.

o Students should be able to independently request relevant diagnostic examinations for the above-mentioned nephrological and endocrinological diseases (see above).

o Students should have interpreted pathological diagnostic findings of at least one patient with the above-mentioned nephrological and endocrinological diseases.

o Students should have developed a treatment plan for a patient with the above-mentioned nephrological and endocrinological diseases at least once.

•Attitude:

o When taking the medical history and examining the patient, students should demonstrate a confident and professional approach and be considerate of the patient.

o Students should address the concerns of the acutely ill patient and be able to explain diagnostic and therapeutic measures to the patient.

Contents:

IVL 1:

Subject areas:

Nervous system (topodiagnosis, intracranial pressure, peripheral/central)

Blood (coagulation/wound healing)

Molecular biology of genetic modifications (principles)

Neoplasia

Water, electrolyte and acid/base balance (Na&H₂O, K&S/B, Ca)

Metabolism (receptor/ligand, hyperlipidemia & -glycemia)

Liver (insufficiency, cirrhosis, hepatopulmonary & hepatorenal syndrome)

Internal secretion

Digestion & resorption

Locomotor system (bone healing, bone formation and resorption)

Heart & circulatory system (shock, insufficiency, arteriosclerosis)

Gas exchange (obstruction/restriction, smaller & larger circuit)

IVL 2.1:

- Myocardial infarction, clinical manifestation

- Myocardial infarction diagnosis and therapy

- Myocardial infarction complications

- Coronary heart disease: diagnostics and clinic

- Coronary heart disease: therapy (conservative, interventional surgery)

- Primary and secondary prevention

- Bradyarrhythmia

- Tachycardic arrhythmia

- Sudden cardiac death: risk stratification

- Heart insufficiency

- Cardiomyopathy and heart transplant

- Shunt lesions

- Peri- and endocarditis

- Aortic valve defects

- Mitral and tricuspid defects

- Aortic aneurysm
- Diseases of supra aortic vessels
- Arteriosclerosis manifestations
- Acute ischemia PAD diagnosis and therapy
 - Thrombosis
- Lung embolism and varicosis
- Pulmonary function and arterial blood gas (ABG)
- Pneumonia and TB
- Lung tumors: - Diagnostics and therapy
- Asthma
- COPD
- Pulmonary hypertension (1 hour)
- Interstitial lung diseases
- Anemia
- Thrombocytopenia/pancytopenia
- MDS / acute leukemia
- Acute leukemia / MPS
- MPD/lymphoma
- Lymphoma
- CLL / myeloma

IVL 2.2:

- Acute renal failure, contrast-induced nephropathy, cholesterol embolism, tumor lysis syndrome
- Chronic renal failure renal anemia, consequences of metabolic acidosis, mechanisms of progression, therapeutic approaches
- Chronic renal failure hyperparathyroidism, renal osteodystrophy
- Glomerular diseases: nephritic vs nephrotic syndrome, amyloidosis, hepatorenal syndrome, analgesic nephropathy, interstitial nephritis
- Glomerular diseases: IgA, RPGN, Goodpasture, post-infectious, secondary glomerulonephritis, diabetic nephropathy
- TTP/HUS, hereditary kidney diseases: polycystic nephropathy
- Hypertension: arterial hypertension hypertensive emergency
- Sleep-related respiratory disorders
- Hypertension: secondary forms pheochromocytoma, Conn, renal artery stenosis,
- Hypertension: cardiovascular complications
- Kidney and urinary tract infections
- Dialysis/CAPD
- Transplantation/organ donation
- Appendicitis/diverticulitis
- Gallstones/cholecystitis
- Ileus
- Gastrointestinal hemorrhage
- Ulcers/gastritis/perforation
- Reflux
- Acute/chronic pancreatitis
- Diabetes
- Cardiovascular complications / diabetic nephropathy
- Adrenal gland (incidentaloma/MEN)
- Pituitary gland
- Hyper- and hypothyroidism/thyroiditis
- Struma/thyroid carcinoma
- Acute liver diseases
- Chronic liver diseases
- HCC/transplantation
- CED
- CED/infectious colitis
- Irritable bowel syndrome/sprue/malabsorption

- Esophagus CA
- Stomach CA
- Pancreas CA
- Colon CA (incl. prevention)
- Colon CA (incl. liver metastases)
- Molecular diagnostics
- HIV

IVL 2.3:

- Infectious arthritides, septic / reactive morbus Bechterew
- Rheumatoid arthritides, gout/pseudogout/arthopathy
- Lupus/granulomatosis with polyangiitis, sarcoidosis
- Scleroderma, Sjögren's, mixed connective tissue disease, overlap, dermatitis/polymyositis arthrosis of finger joints and large joints
- Spondylosis deformans, fibromyalgia

IVL 3:

- Fever
- Body aches
- Weight loss
- Anemia
- Chest pain
- Dyspnea
- Diarrhea
- Edema
- Abdominal pain
- Adynamia

Specific examination techniques in Internal Medicine: This course takes place in the various wards of Internal Medicine 2 x 1.5 hours per semester during the 1st clinical year. In this course, students will learn how to take a focused, symptom-directed medical history and perform a physical examination on patients.

Bedside course: This course takes place in the various wards of Internal Medicine 7 x 3 hours per semester during the 2nd clinical year. In this course, students refresh their knowledge by taking a medical history and performing physical examinations. They also learn how to use targeted diagnostics and treat the relevant diseases in the field of Internal Medicine.

Teaching and learning method:

Lecture, practical exercise on other students (specific examination techniques), practical exercise on the patient's bedside (bedside course). The teaching materials are available to students on mediTUM.

EF0012 Pediatrics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	56

Description of coursework and examinations:

Main lecture Pediatrics: 44 lectures. 22-23 lectures for Pediatrics 1 and 2 each; certificate is acquired by passing one written exam each.

Written exam Pediatrics 1: 50 MC questions (at the end of the semester)

Written exam Pediatrics 2: 50 MC questions (at the end of the semester)

Intended learning outcomes:

As part of this subject, students acquire fundamental knowledge in Pediatrics. Here, the focus is on a wide range of medical disciplines relating specifically to children. After completing the courses, students should be able to understand and apply the most important clinical pictures, diagnostic methods and therapeutic approaches in Pediatrics. The aim is to prepare students for the challenges of everyday medical practice and to make them capable points of contact for fundamental questions in the field of Pediatrics.

Contents:

The lecture series Pediatrics 1 and Pediatrics 2 cover the following subjects:

Focus areas of Pediatrics 1: General Pediatrics, Pediatric Surgery, Pediatric Radiology, Neonatology, Congenital Infections, Dermatology, ENT, Immunology, Rheumatology, Pulmonology, Allergology, Cardiology.

Focus areas of Pediatrics 2: Social Pediatrics, Metabolism, Endocrinology, Nutrition, Gastroenterology, Oncology, Neurology, Orthopedics, Accidents, Poisoning, Nephrology, Urology, Gynecology, Psychiatry, Psychosomatics. Pediatrics 1 + 2: Hematology, Infectiology, Malformations, Development, Prevention, Genetics (because these are very broad fields)

Teaching and learning method:

Lecture. The teaching slides are available on mediTUM.

Responsible:

Prof. Dr. med. Uta Behrends, uta.behrends@mri.tum.de

OA PD Dr. med. Hendrik Jünger, hendrik.juenger@mri.tum.de

OÄ Dr. med. Katharina Warncke, katharina.warncke@mri.tum.de

Christoph Dörfler (TA), christoph.doerfler@mri.tum.de

EF0020 Forensic Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.50	20

Description of coursework and examinations:

Active participation in lecture Forensic Medicine and the practical course in Forensic Medicine (post-mortem examination, takes place in the Forensic Medicine department).

Intended learning outcomes:

In this course, students acquire fundamental knowledge and skills in Forensic Medicine. They learn how to carry out post-mortem examinations professionally and identify causes of death. Students will be trained to identify and interpret typical findings in various causes of death, such as sharp and blunt force trauma, child abuse, suffocation and Toxicology. Furthermore, they will gain insights into medical law and the preparation of medical reports as well as the importance of Forensic Science and DNA analysis in Forensic Medicine.

Contents:

- Introduction; early pm changes: post-mortem lividity, rigor mortis; indications of vital reactions
- Late pm changes; sudden natural death
- Post-mortem examination; time of death; autopsy rights
- Sharp force trauma
- Blunt force trauma
- Child abuse
- Suffocation incl. drowning
- Toxicology/Alcohol
- Medical law; medical reports
- Electricity, heat, cold
- Gunshots
- Forensic analysis/DNA: traces, paternity

Teaching and learning method:

Lecture. The teaching slides are available on mediTUM. Practical course with supervised performance of a post-mortem examination.

Responsible:

Prof. Inga Sinicina: inga.sinicina@med.uni-muenchen.de

EF0023 Elective

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	15

Overview of electives (obligatory optional subjects): see study regulations (Studienordnung)

EF0009 Human Genetics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.50	19.5

Description of coursework and examinations:

Seminars: 3 hours

Lecture: 16.5 hours

Examination: MC written exam at the end of the semester.

Intended learning outcomes:

In this subject, students gain an in-depth understanding of genetic principles and applications. They will be introduced to the latest developments in the field of Genome Projects and gain insights into the history of and current trends in Human Genetics. By covering topics such as gene mapping, mitochondrial genetics and genetic mechanisms of common diseases, students will acquire the ability to interpret and apply genetic concepts. They will also gain knowledge in Syndromology, Cytogenetics and Prenatal Diagnostics. After completing Human Genetics, students will be able to critically evaluate genetic information and apply it in clinical and research-oriented contexts.

Contents:

- Genetic counseling
- Molecular diagnostics
- Gene expression
- Genome Project
- History of Human Genetics
- Gene mapping
- Gene expression
- Mitochondrial genetics
- Monogenic diseases
- Genetics of common diseases
- Mechanisms of mutation
- Population genetics
- Risks
- Syndromology
- Cytogenetics
- Trinucleotide disorders
- Prenatal diagnostics

Teaching and learning method:

Lecture and seminar with further study and repetition of the lecture contents.

Responsible:

PD Dr. Michael Zech: michael.zech@mri.tum.de

EF0010 Hygiene, Microbiology, Virology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	73.5

Description of coursework and examinations:

Courses offered:

1. 1 Main lecture Microbiology, Virology, Parasitology, Hygiene, Immunology

2. 1 course (2 block internships per semester): Microbiology, Virology, Parasitology, Hygiene, Immunology

Examination: Written exam at the end of the semester with 30 MC questions and usual assessment in the form of grades (minimum passing score 60%), repetition possible at the end of the following semester

Intended learning outcomes:

On point 1. lecture topics: The main lecture aims to provide students with the underlying theoretical principles. Here, the focus is on learning for future clinical work and, in particular, on the important role of Immunology in various clinical disciplines.

On point 2. course/practical course: Learning objective/keywords: Contents of the practical course include Microbiology, Immunology, Hygiene and Virology. The main aim is to provide practical insights into laboratory work in Microbiology and Virology based on clinical case studies. This is done in groups, which are supervised by assistants throughout the course. Particular emphasis is placed on enabling students to work independently.

Contents:

Further information on the content of the main lecture "Microbiology, Parasitology, Hygiene, Virology and Immunology" can be found at: <https://campus.tum.de/tumonline/webnav.ini> (please follow the links Medicine - Institutes - Institute of Med. Microbiology, Immunology and Hygiene to "courses")

For details on the teaching content of the practical course, please visit:

<https://campus.tum.de/tumonline/webnav.ini> (follow the links Medicine - Institutes - Institute of Med. Microbiology, Immunology and Hygiene to "courses")

Teaching and learning method:

Lecture and laboratory courses with guided execution of microbiological experiments and subsequent evaluation and documentation of the results. The teaching slides are available on mediTUM.

Responsible:

PD Dr. med. Clarissa Prazeres da Costa

Dr. med. Michael Neuenhahn

Dr.med. Dieter Hoffmann

EF0013 Clinical Chemistry, Laboratory Diagnostics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	48.25

Description of coursework and examinations:

Courses offered:

lecture (13.25 hours)

practical course (35 hours)

practical course – organization:

- 3 hours per week
- at the beginning of each event: Test (to be prepared for using the script)
- Repetition of theory
- Performance review (results slip must be handed in)

Examination:

- There is no standard final examination,
- the final grade is based on the results of all tests and the course transcripts,
- an oral examination is held if a certain number of points is not achieved. Otherwise, the course must be repeated.

Intended learning outcomes:

Students acquire sound knowledge in the field of Clinical Chemistry and Laboratory Diagnostics, which includes the analysis and interpretation of metabolic parameters, cardiac diseases, lipid metabolism disorders and hematological diseases. They develop practical skills in laboratory work through hands-on experience in performing and evaluating testing methods such as photometry, immunoassays and electrophoresis. The goal is to prepare students to apply these skills in the framework of employment in clinical settings, with a strong focus on accuracy, quality assurance and critical analysis of laboratory data.

Contents:

Topics of the lecture and the practical course:

- Clinical and chemical diagnostics of the liver: metabolic parameters, photometry
- Diagnostics of acute coronary syndromes: CK, myoglobin, troponin
- Lipid metabolism: biochemical principles, metabolic disorders, therapy goals, determination of cholesterol, HDL, LDL, TG
- Hematology I: Blood count, clinical relevance, anemia, polycythemia, thrombocytopenia, cell count, blood slide
- Hematology II: Differential blood count, clinical significance of the subpopulations, leukemia, myelodysplastic syndrome, lymphomas, blood slide, staining, differentiation
- Immunology and Protein Chemistry: Immunoassay methods, Biochemistry and serum protein disorders, electrophoresis
- Endocrinology and analytics of steroid hormones: physiology of the sexual hormones, estradiol and testosterone, determination with immunoassay
- Hemostaseology I: Physiology, anticoagulation, quick-test, INR, aPTT
- Hemostaseology II: Factor XIII analysis, primary hemostasis and bleeding time, antithrombin-determination, diagnostics of thrombophilia, factor V Leiden (APC- resistance) und APC-sensitivity-test (APC-ratio)
- Kidney, electrolytes und proteinuria diagnostics: principles and clinical relevance, urine strips, determining protein und creatinin concentration in the urine
- Diabetes mellitus: blood glucose level, oGTT, HbA1c-test, creatinin concentration, determination of glucose level and ketone bodies in the urine
- Fundamentals of laboratory diagnostics and quality control: Indications, reference range, sensitivity and specificity, accuracy, standardization and guidelines

Teaching and learning method:

Lecture and laboratory course with guided laboratory work and independent evaluation and documentation of the results. The teaching slides are available on mediTUM.

Responsible:

Dr. Winter (christof.winter@tum.de)

EF0016 Pathology

Level: Medicine (clinical)	Language of instruction: German	Credits: 10.00	Total hours: 94.5
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Description of coursework and examinations:

For Pathology, there are two grade reports of courses and exams passed:

General Pathology in the 1st academic year and Specialized Pathology in the 2nd academic year of clinical studies.

To obtain the certificate in General Pathology, students must participate in the hybrid teaching format Digipath and complete the course on post-mortem examination.

Digipath:

Lecture and group classes General Pathology:

completion of a Moodle course, flanked by a weekly "Clinical Pathology" session with required on-site attendance. Subsequently, students take an oral exam. After successful completion of the oral exam, group work begins. This takes place in project groups and comprises **5 weekly on-site sessions with required attendance** in small groups.

The course format concludes with a poster presentation on "A Day in Pathology".

Post-mortem examination course:

The post-mortem examination course is offered alongside the lecture in the first year of study. Students are assigned to the post-mortem examination course for one week per semester. Should there be an autopsy during the week from Monday to Friday, the group of assigned students will receive an e-mail by 8:30 am at the latest on the day of the autopsy. If an autopsy is performed, the course takes place as part of a post-mortem examination from 11 am to 1 pm.

If there is no autopsy in the respective week, the course will be held as part of a seminar on Fridays from 11 am to 1 pm.

To complete the subject General Pathology, the oral exam and the group classes "Projects in Pathology", including "A Day in Pathology", as well as the post-mortem examination course must be successfully completed.

The certificate for Specialized Pathology is gained by passing the written exam of the interdisciplinary lectures IVL 2.1 and 2.2. Examination: MC written exam at the end of the semester.

Intended learning outcomes:

In this course, students acquire a sound knowledge of General and Specialized Pathology. They learn to understand and analyze pathological processes and clinical pictures. By participating in seminars, Peer Teaching and post-mortem examinations, they develop practical skills in diagnosing and evaluating pathological changes. Furthermore, they learn to effectively communicate their knowledge in oral exams and presentations.

Contents:

Seminars:

- Death and post-mortem examination
- Fundamentals of Pathology - Atrophy, regeneration, metaplasia, edema, etc.
- Lymphoma
- Diseases of the cardiovascular system
- Inflammation
- Tumors
- Neuropathology

Peer Teaching:

- Etiology, pathogenesis, clinical pictures and fundamentals of treatment
- pathological changes visible in tumors, infarctions, scleroses, etc.

IVL 2.1:

- Myocardial infarction complications
- Shunt lesions
- Arteriosclerosis manifestations
- Thrombosis
- Lung tumors: pathology (1 hour)
- Interstitial lung diseases
- MDS / acute leukemia
- Acute leukemia / MPS
- MPD/lymphoma

- Lymphoma
- CLL / myeloma
- IVL 2.2:
- Ulcers/gastritis/perforation
- Reflux
- Acute/chronic pancreatitis
- Struma/thyroid carcinoma
- Acute liver diseases
- Chronic liver diseases
- HCC/transplantation
- CED
- Esophagus CA
- Stomach CA
- Pancreas CA
- Colon CA (incl. prevention)
- Colon CA (incl. liver metastases)
- Rectal CA
- Molecular diagnostics

Teaching and learning method:

General Pathology: The underlying theoretical principles are taught in a hybrid format. On five afternoons, small groups work in project groups; the students are using microscopes and have to study 37 histological images. Hands-on training as part of the post-mortem examination course.
Specialized Pathology: Lecture.

Responsible:

Dr. med. Alexander Muckenhuber: alexander.muckenhuber@tum.de

EF0017 Pharmacology, Toxicology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	7.00	56

Description of coursework and examinations:

The course consists of the lecture Pharmacology, Toxicology and the seminar Pharmacology.
Examination: MC written exam at end of semester

Intended learning outcomes:

Students should acquire a sound understanding of the fundamental principles of Pharmacodynamics and Pharmacokinetics/-genetics. They will be able to understand and explain the mechanisms of action and therapeutic applications of important groups of drugs such as antiarrhythmics, sex hormones, ACE inhibitors, diuretics, antidiabetics and others. The course furthermore aims at providing students with in-depth knowledge of Toxicology and the safe handling of medicines in order to ensure competent patient care.

Contents:

- Pharmacodynamics
- Pharmacokinetics/-genetics
- Sympathetic nervous system
- Parasympathetic nervous system
- Antiarrhythmics
- Sex hormones
- ACE inhibitors/calcium channel blockers/nitrovasodilators
- Diuretics
- Antidiabetics

- Antiplatelet drugs/anticoagulants/fibrinolytics
- Anti-Parkinson's drugs
- Antiepileptic drugs
- Antidepressants
- Analgesics
- Virostatic agents / antifungal agents
- Antibiotics I
- Antibiotics II
- Immunosuppressive drugs
- Cytostatics / anti-tumor antibodies
- Toxicology

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM. In addition, students will get access to an online list of the 300 most important pharmaceuticals (<http://tum300.de/>). Seminar in small groups with presentations and discussions to follow up on the lecture material.

Responsible:

Dr. Bernhard Laggerbauer: bernhard.laggerbauer@tum.de

EF0014 Neurology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	48.25

Description of coursework and examinations:

The following courses will be offered:

1. Main lecture Neurology
2. Bedside course Neurology
3. Block internship Neurology

Intended learning outcomes:

Bedside course Neurology:

Learning objective: At the end of the bedside course students should be able to independently perform a complete neurological examination, as well as collect and describe pathological findings.

Contents:

1. Topics of the main lecture
 - Introduction and metabolic diseases of the CNS: Wernicke's encephalopathy, PRES, pontine myelinolysis
 - Autoimmune diseases of the CNS I: pathophysiological principles of neuroimmunological diseases based on multiple sclerosis as an example
 - Autoimmune diseases of the CNS II: neuroimmunological diseases - variants and differential diagnosis: limbic encephalitis/paraneoplastic disorders
 - Inflammation of the CNS: meningitis/encephalitis, other infections (e.g. Lyme disease, HIV, zoster)
 - Differential diagnosis spinal syndromes
 - Dysimmune neuropathy: GBS, CIDP
 - Classification of brain tumors, radiological diagnostics, treatment
 - Hypokinetic movement disorders 1 introduction /general classification/ IPS
 - Hyperkinetic movement disorders tremor & dystonia
 - Hypokinetic movement disorders 2 differential diagnosis atypical Parkinson's syndromes & gait abnormalities
 - Dementia
 - Cerebrovascular diseases I: ischemic stroke, diagnosis & treatment
 - Sleep disorders, RLS, narcolepsy
 - Cerebrovascular diseases II: hemorrhagic stroke, diagnosis and treatment
 - Chorea / ataxia

- Epilepsy & seizure-like disorders
- Neuromuscular diseases (myasthenia, Lambert Eaton)
- The most common peripheral syndromes, fundamentals of Electrophysiology, typical plexus and nerve lesions
- Brain death
- Primary headaches, neuropathic pain, facial pain
- Dizziness
- Myopathies, motor neuron diseases
- The most common cranial nerve syndromes

2. Bedside course Neurology:

Concept: Students will work in small groups of 6 under the guidance of a neurologist to repeat the neurological examination that they have already learned about as part of the Peer Teaching Basic Medical Examination in the first year of study and practice it on patients. Here, the focus is now on taking a focused, symptom-directed medical history and performing a neurological examination on the patient, as well as collecting and clinically classifying pathological findings.

The focus here is on a focused, symptom-directed neurological examination and collecting pathological findings. The first session (specific neurological examination) begins with a repetition of the basic neurological examination and covers some additional aspects (specific examination techniques, e.g. in the event of a stroke, double vision or dizziness). The main focus is on identifying and describing specific pathological findings. The first session concludes with a collective assessment of the systematic neurological findings. The second session (patient examination) is about practicing a focussed symptom-directed neurological examination on a neurological patient. The emphasis is on constructive criticism of the examination technique and correct description of the findings. The path from the individual symptom ("my right arm is weak") to the functional syndrome ("brachiofacial emphatic sensorimotor hemisyndromatopathy on the right") takes center stage and is the starting point for the subsequent considerations on a differential diagnosis. At the end of the course "Specific Neurological Examination & Assessment of Patient Findings", students should be able to independently and correctly perform a complete neurological examination and present the findings in a systematic form (keyword "ward round").

3. Block internship Neurology: The block internship in the 3rd academic year is based on the examination techniques and diagnostics learned in the bedside course. While the bedside course focused on the correct examination technique and diagnosis, the block internship Neurology focuses on "clinical management", i.e. the diagnostic and therapeutic procedure and the discussion of possible differential diagnoses.

Teaching and learning method:

Lecture: The lecture follows the flipped classroom format. Bedside course with independent neurological examination of patients and hands-on training of examination techniques. Integrated clinical learning during the block internship.

Responsible:

Lecture and block internship: PD Dr. Friederike Schmidt-Graf: f.schmidt-graf@tum.de

Bedside course: Dr. Rebecca Wicklein: rebecca.wicklein@tum.de

EF0018 Psychiatry, Psychotherapy

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	5.00	55

Description of coursework units and examinations:

The following courses are offered:

1. Psychiatry main lecture
2. Psychiatry block internship

Written exam:

1st part: Students have to work on a case (open questions)

2nd part: Multiple choice written exam

Intended learning outcomes:

Learning objectives of psychiatry block internship:

Over a whole week, internship students accompany the ward or outpatient staff during their morning work and take part in different teaching units in the afternoons. The teaching units cover the medical psychiatric assessment and teaching blocks on neuropsychology, psychological diagnostics and therapy, socio-pedagogical therapy, and the neurological-psychiatric differential diagnostics. The areas of specialization for the individual teaching units are described in brief below:

Mornings in the wards/outpatient department: The day begins with the morning hand-over for the on-call service events. On Wednesday, there is a case conference immediately afterwards with presentation of current treatment cases and an interdisciplinary discussion. The students then take part in the routine work on the wards, the day clinic, the outpatient department and the counseling service (among others also toxicological liaison service). Educational content is taught in the areas of psychiatric findings, organic differential diagnostics, pathology, medicinal and psychotherapeutic treatment planning and performance, patient management, and special treatment techniques (e.g. electroconvulsive therapy, ECT).

Case presentations in afternoons: In the afternoons, the students examine patients together with the senior doctor supervising the course. The students practice psychiatric exploration in the process. The findings are then collected, scrutinized, assessed, evaluated in terms of differential diagnosis, and assigned to the clinical pictures; if the schedule allows and the students' knowledge level so requires, psychopharmacology and general pathology are included. The focus is, however, on teaching the psychiatric exploration technique. The students document an exploration they have performed during the course week in writing and have it checked by the responsible ward doctor for completeness and factual correctness.

Neuropsychology: The neuropsychology teaching block has three central learning objectives: The description of the "Clinical Neuropsychology" function unit in the setting of the Psychiatric Clinic, the explanation of the applied methods (above all, psychometric test diagnostics) and the presentation of the respective indications for in-depth neuropsychological examination. Starting with the definition of clinical neuropsychology as an applied science for investigating brain-behavior interactions and their disorders as a basis for suitable therapeutic approaches, the principal tasks of neuropsychological diagnostics in psychiatry, neurology and related disciplines are addressed: Cognitive status and progression diagnostics, support of medical disease diagnostics using neuropsychological differential diagnostics and early recognition of cognitive impairments, clarification of the behavioral relevance of neuroradiological findings, assessing consequences of deficits, therapy planning and evaluation. An overview is provided of the taxonomy of mental functions as well as of the modular structure of cognitive abilities, in particular using the example of attentional and mnemonic information processing. The methodological principles of psychometrics as the dominant subject-specific examination approach in clinical neuropsychology are only briefly touched upon. Their essential practical aspects (standardization, quantification, construct and norm reference) are, however, illustrated using an exemplary test processing in small groups. Depending on the questions and interests of the seminar participants, specific topics can be discussed in more detail, for example, the (complementary) relationship between cranial imaging and neuropsychological examinations or the role of neuropsychology in the context of multi-level dementia diagnostics. Historical case descriptions (patients P.G. and H.M.) and selected research studies (e.g. London taxi driver study) illustrate the learning content using examples, which are then summarized using the students' own case presentation.

Neurological-psychiatric differential diagnostics: The aim of this teaching unit is to provide an overview of the spectrum of mental disorders that can be traced back to organic causes in the narrower sense. The most important components of neurological-psychiatric diagnostics are explained and specific practical instructions for differential diagnostics are taught. The seminar is mainly based on case studies. After a joint discussion of an example case involving all seminar participants, the participants then work on an individual case in small groups of 2–4 students under the supervision of the neurological lecturer. Finally, each case is presented by each small group to all seminar participants and discussed together.

Social psychiatry (socio-pedagogical teaching unit): As part of this teaching unit, a brief overview is provided of the extremely wide ranging tasks in social psychiatry and the work of the social education workers. In addition to the individual support of patients against the background of possible social stigmatization due to mental illness and problematic biographic breaks, the core areas of family (care of minors, relatives dependent on care, single-parent problems, etc.), work (behavior towards employers/colleagues, sick leave, job placements, rehabilitation measures, etc.),

social insurance issues, housing situations and community-based ongoing care following discharge from hospital or semi-residential care are addressed using specific case studies.

Psychotherapy: The “Psychotherapy” seminar gives students insights into the fundamentals of psychotherapeutic treatment. The principles of psychodynamic and behavioral therapy methods as well as cross-method effectiveness factors are explained. Also, the behavioral therapy procedure (diagnostics – setting goals – planning therapy – therapy modules and techniques – evaluation) is clearly presented in the context of in-hospital treatment using case examples. A patient from the clinic reports on their experiences with individual and group psychotherapy and answers questions from the students. Linking theoretical explanations with the presentation of practical implementation from the perspective of the addressee allows the knowledge gained to be better memorized.

Content:

Lecture topics:

- Psychiatry main lecture
- Topics:
 - Dementia
 - Schizophrenia
 - Hallucinations
 - Confusional states/delirium
 - Addiction
 - Amnesia syndrome (Korsakoff)
 - Affective disorders + schizoaffective psychoses
 - Personality disorders

At the end of each lecture, Prof. Förstl hands out a sheet with key points or a brief summary of the lecture. Several patients are brought to each lecture and presented.

Block internship: total of 1 week in block, possible in the first or last three weeks of the semester, offered in both the winter semester and the summer semester. Ward, seminars, ending with case presentation.

Teaching and learning method:

Lecture with patient presentation. Block internship: The block internship takes place in the clinic and allows clinical knowledge to be used in practical situations.

Responsible:

Dr. Max Burger max.burger@mri.tum.de

Deputy: Oliver Goldhardt: oliver.goldhardt@mri.tum.de

EF0019 Psychosomatic Medicine and Psychotherapy

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.50	34

Description of coursework units and examinations:

The subject consists of the Psychosomatics lecture, the Psychosomatics seminar and Doctor-Patient Conversations 2, as well as the Psychosomatics internship day.

Examination: MC written exam at end of semester

Intended learning outcomes:

In this subject, students should gain extensive knowledge of psychosomatic clinical pictures, including their diagnosis and differential diagnostics. They learn to identify psychosomatic aspects in physical illnesses and perform psychosomatic anamneses. Furthermore, they gain skills in communication and doctor-patient conversations, learn about psychotherapeutic approaches and provision of care in Germany and gain insight into the practical implementation of psychosomatic medicine in everyday clinic work.

Content:

As a rule, the lecture begins with the presentation of a patient and covers the following topics:

Features of the relevant psychosomatic clinical pictures

- Diagnostics and differential diagnostics of these clinical pictures
- Psychosomatics with physical illnesses
- Psychosomatic anamnesis
- Communication
- Psychotherapeutic approaches and provision of care in Germany
- Psychosomatic qualifications

ÄGF-2: Practicing challenging conversation situations with simulated patients

Psychosomatics internship day: During the internship day, the students shadow the doctors and psychologists working at our clinic, i.e. in small groups, they take part in outpatient consultations (general psychosomatic outpatient clinic, trauma outpatient clinic, and psycho-oncological outpatient clinic), in the consultation service or in patient rounds and patient treatment on wards or in the day clinic. The aim of the internship day is to learn about everyday work in psychosomatics, and experience patients, their reasons for coming, and their own expectations at first hand. In the outpatient clinic, you will specifically learn how to progress from diagnosis to treatment planning. In the consultation service, you will look at diagnostics, support or the start of treatment depending on the problem and specialized area for a somatic in-patient situation. In wards and the day clinic, you will take part in the rounds or treatment offers and be shown in detail the concept of in-patient psychosomatic, multi-modal treatment.

Teaching and learning method:

Lecture, seminar for practicing patient-doctor conversation techniques, internship day with work in hospital setting.

Responsible:

PD Dr. Andreas Dinkel a.dinkel@tum.de

Dr. med. Christine Allwang: c.allwang@tum.de

EF0002 Anesthesiology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.50	29

Description of coursework units and examinations:

The course consists of:

1. Anesthesiology lecture
2. Block internship

Examination: Written exam at the end of the semester with 30 to 40 MC questions (minimum passing score 60%), repeat exam one semester later.

Intended learning outcomes:

In the Anesthesiology block internship students learn about fundamental peri-operative-anesthesiological work. This includes pre-operative preparation of the patient for anesthesia, anesthesia induction and discharge, intraoperative anesthesiological measures such as monitoring, infusion, and transfusion therapy, as well as post-operative pain therapy.

Content:

1. Lecture topics:

Pre-operative phase (risk evaluation, explanation), anesthetics, opioids, muscle relaxants, anesthesia induction, airway management, ventilation, monitoring, cardiovascular drugs, infusion, transfusion, complications in anesthesia, regional anesthesia, anesthesia in gynecology and obstetrics, pediatric anesthesia, pain therapy, traumatic brain injury, sepsis, ARDS

2. Block internship: The block internship is staged on two consecutive days in the operating theater in very small groups (1 to 2 students per lecturer). In advance, theoretical fundamentals are repeated in a 90-minute introductory seminar and practical questions on the procedure are clarified. A special feature on both days will be a 90-minute training course on the anesthesia simulator in groups of around 6 to 8 students, during which participants will be able to perform simple and also more complicated anesthesia inductions themselves.

Teaching and learning method:

Lecture and block internship. The block internship takes place in the clinic and allows clinical knowledge to be used in practical situations.

Responsible:

PD Dr. Rainer Haseneder, r.haseneder@lrz.tum.de

EF0005 Surgery

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.50	58

Description of coursework units and examinations:

The specialization consists of the surgical part of the interdisciplinary lectures IVL 2.1 and 2.2, the surgery internship day (MKG) and the basic and advanced MTC ward management.

Examination: MC written exam IVL 2.1 and 2.2, participation in the internship day and the MTC ward management

Intended learning outcomes:

The students learned founded knowledge in the areas of cardiovascular diseases, gastrointestinal pathologies, surgical oncology as well as traumatology of the facial region. Through a combination of interdisciplinary lectures, practical exercises and realistic simulations in ward management, they develop skills in diagnostics, treatment decisions and surgical techniques.

Content:

IVL 2.1:

- Myocardial infarction complications
- Coronary heart disease: therapy (conservative, interventional surgery)
- Cardiomyopathy and heart transplant
- Aortic valve defects
- Mitral and tricuspid defects
- Aortic aneurysm
- Diseases of supra aortic vessels
- Acute ischemia PAD diagnosis and therapy
- Lung embolism and varicosis
- Lung tumors: diagnosis and therapy

IVL 2.2:

- Hypertension: secondary forms pheochromocytoma, Conn, renal artery Stenosis
- Dialysis/CAPD
- Appendicitis/diverticulitis
- Gallstones/cholecystitis
- Ileus

- Hernia
- Abdominal trauma
- Gastrointestinal hemorrhage
- Ulcers/gastritis/perforation
- Reflux
- Acute/chronic pancreatitis
- Struma/thyroid carcinoma
- HCC/transplantation
- IBD
- Proctology
- Esophagus CA
- Stomach CA
- Pancreatic CA
- Colon CA (incl. prevention)
- Colon CA (incl. liver metastases)
- Rectal CA

Surgery internship day (MKG):

- Traumatology and fractures to viscerocranium
- Oncology, malignant facial skin tumors, malignant tumors in mouth cavity
- Reconstruction, flap surgery

MTC ward management:

After the students have learned the fundamentals of pre- and post-operative ward management with the aid of Moodle courses, they are trained in everyday clinic tasks in the practical parts of the course, for example:

- Explaining an operation
- Suitable patient presentation
- Ward round conversations

Each student gets an opportunity to hold a simulated doctor-patient conversation and obtain individual feedback.

Teaching and learning method:

Lecture. Internship day with practical performance of examination and operation techniques on models. MTC courses in clinical simulation center for realistic practice of ward procedures.

Responsible:

IVL 2.1: PD Dr. med. Isabell Bernlochner: isabell.bernlochner@mri.tum.de

IVL 2.2: Dr. med. Johannes Wießner: johannesroman.wiessner2@mri.tum.de

Internship day MKG: PD Dr. med. Dr. med. dent. Lucas Ritschl: lucas.ritschl@tum.de

MTC ward management: Kathleen Lindemann: mtc.sto@mh.tum.de

EF0015 Orthopedics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.00	36.25

Description of coursework units and examinations:

Lecture: The most important lecture for orthopedics is the interdisciplinary lecture 2.3 (IVL 2.3) (only in summer semester)

Bedside course orthopedics: Practicing anamnesis and physical examination and discussion of cases with the department doctors.

Written exam: MC written exam at the end of the semester.

Intended learning outcomes:

The students should gain extensive knowledge of orthopedics fundamentals, including anatomy, biomechanics, and medical imaging. They learn how to recognize and understand orthopedic clinical pictures, from injuries to soft tissue through fractures and onto specific illnesses like arthrosis and osteoporosis. In the bedside course, practical skills in anamnesis and physical examinations are expanded, supplemented by the discussion on real cases with experienced doctors.

Content:

- Propedeutics BWA
- BWA anatomy + medical imaging
- Biomechanics, orthopedic technology
- Soft tissue ligament injuries I (KG, SG)
- Soft tissue ligament injuries II (Schu, Ellb)
- General fracture teaching, osteosynthesis techniques
- Polytrauma shock room management
- Fractures + luxations (spine + pelvis)
- Fractures + luxations (upper limbs + lower limbs)
- Trauma complications (Sudeck, pseudoarthrosis, compartment, etc.)
- Pediatric traumatology
- Osteoporosis
- Geriatric traumatology (fall syndrome, osteoporosis, geriatric assessment)
- Arthrosis I
- Arthrosis II (incl. localized cartilage defects)
- Infectious arthritis, septic/reactive morbus Bechterew
- Rheumatoid arthritis, gout/pseudogout/arthopathy
- Lupus/granulomatosis with polyangiitis, sarcoidosis
- Scleroderma, Sjögren's, mixed connective tissue disease, overlap, dermatitis/polymyositis arthrosis of finger joints and large joints
- Spondylosis deformans, fibromyalgia
- Tumors BWA
- Wound treatment
- Burns; soft tissue coverage
- Spine I
- Spine II
- Pain therapy BWA
- Osteonecrosis
- Neuro-orthopedic disorders (ICP etc.)
- Congenital deformities (hip dysplasia, club foot, vertical talus, arthrogryposis)
- Pediatric orthopedic disorders (torticollis, scoliosis, axis deformities)
- Foot disorders (adults)
- Hand disorders
- Conservative orthopedics
- Principles of physiotherapy, rehabilitation, primary and secondary prevention

Teaching and learning method:

Lecture and bedside course. The students practice orthopedic anamnesis and examination techniques with patients in the bedside course.

Responsible:

IVL 2.3: Prof. Dr. Rainer Burgkart: rainer.burgkart@tum.de, Fritz Seidl: fritz.seidl@tum.de

Bedside course:

Orthopedics: Dr. Florian Lenze: Florian.Lenze@mri.tum.de

Accident surgery: PD Dr. Moritz Crönlein: Moritz.Croenlein@mri.tum.de

Sport orthopedics: Dr. Bastian Scheiderer: bastian.scheiderer@tum.de

EF0021 Urology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.50	25

Description of coursework units and examinations:

Courses offered:

1. Urology main lecture, Thursdays 3:15 p.m. to 5:00 p.m.
2. Urology internship day

Examination: Written exam at the end of the semester with 30 MC questions (minimum passing score 60%), repeat exam one semester later

Intended learning outcomes:

The students should develop a fundamental understanding of the core areas of urology. This includes the history and fundamental concepts of urology, the diagnosis and treatment of urological diseases such as prostrate carcinomas, testicular tumors, and urological infections. Furthermore, practical skills should be fostered in examination and treatment, including sonography and catheters, through participation in lectures and intensive internship units. The students should also learn to deal with urological emergencies and special situations.

Content:

1. Lecture topics:

- History of urology, introduction to urology, pediatric urology I
- Benign prostate syndrome
- Testicular tumors and catheter usage
- Prostate carcinoma
- Pediatric urology II
- Urological infections
- Urolithiasis
- Urological emergencies, autoerotic accidents
- Urothelial carcinoma
- Renal cell carcinoma
- Andrology, infertility, erection, and impotence

2. Internship day

7:45 a.m.: Morning meeting

8:30 a.m. to 12:00 p.m. Walk through wards, practical exercises on phantom, sitting in on operations, bedside teaching

12:00 p.m. to 12:30 p.m. Sonography course

12:30 p.m. to 1:00 p.m.: Catheter course

1:45 p.m. to 2:15 p.m. Sexual anamnesis

2:15 p.m. to 4:00 p.m.: Digital seminar rectal examination and indwelling catheter insertion

Teaching and learning method:

Lecture and internship day. During the internship day, the students learn examination techniques by means of practical exercises on the model.

Responsible:

OA Dr. Michael Autenrieth, michael.autenrieth@lrz.tum.de

QB0002 Cross-sectional Course in History, Theory, and Ethics of Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	20.75

Description of coursework units and examinations:

This subject consists of a lecture and a seminar. It provides a far-reaching insight into the historical development and ethical dimensions of medicine from the beginning to the present day. It covers topics like classical medicine, epidemics, hospital history, psychiatry, eugenics, and medicine under National Socialism. Examination: MC written exam (25 questions), and oral report and essay during the seminar.

Intended learning outcomes:

The students gain knowledge of the development of medicine historically up to the present day. They look at the ethical conflicts and conceptualities of modern medicine. Thanks to the combination of lectures and seminars, including group presentations and discussions, students develop a far-reaching understanding of the historical and ethical dimensions of medicine, from classical medicine through medicine under National Socialism to current questions about healing and research.

Content:

- Classical medicine
- Epidemics in the late Middle Ages and Early Modern Age
- Hospitals
- History and ethics psychiatry
- Medicine in the 19th century – eugenics
- Health and hygiene in industrialization
- Medicine under National Socialism
- Cure and/or research?

Teaching and learning method:

Lecture and seminar with group presentations and discussions. The teaching material is available on mediTUM.

Responsible:

Prof. Dr. Buyx, Jennifer Wladarsch: medizinethik.med@tum.de

QB0001 Cross-sectional Course in Epidemiology, Medical Biometry, and Medical Informatics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.50	43.5

Description of coursework units and examinations:

The course comprises the biometry, epidemiology, and medical informatics lectures, as well as the biometry seminar. The grade report requires that the corresponding written exams are passed and that the seminar was attended.

Examination: MC written exams in epidemiology and medical informatics. Written exam with open and MC questions in biometry.

Intended learning outcomes:

Students

- Have an overview of the subareas of medical statistics.
- Can explain the describing statistics regarding feature types and measurement figures.
- Know which possibilities there are for the graphical depiction of data.
- Know the most important statistical measurement figures and can apply them.

- Know the basic terms of probability theory.
- Know the most important measurement figures for the quality of diagnostic tests (sensitivity, specificity, and predictive values).
- Are able to define the term “normal distribution” and know its most important properties.
- Understand the terms correlation and regression.
- Possess basic knowledge of the correlation and regression analysis and can apply it to specific data.
- Have an overview of the most important study types.
- Know which problems can occur in the planning and implementation of studies and how they can be solved.
- Knows the basic principles of statistical case number planning.

Content:

Biometry:

The aim of the lecture is to teach the essential fundamentals of medical statistics.

The topics addressed include:

- Descriptive statistics
- Diagnostic tests
- Principle of statistical testing
- Selection of statistical tests
- Confidence intervals and equivalence tests
- Regression and stratification
- Survival time analyses
- Trial planning and performance of studies

Epidemiology:

- Introduction, definitions, and measurement figures
- Comparative measurement figures
- Study types
- Confounder, bias, and effect modification
- Statistical modeling
- Genetic epidemiology
- Causality, validity and repeat

Medical informatics:

- Information and knowledge in medicine
- Evidence-based medicine/guidelines
- Medical signal processing
- Medical image processing
- Medical image management and communication
- Quality management
- Clinical studies
- Computer-supported surgery
- Mobile sensors

Teaching and learning method:

Lectures and seminar. In the seminar, students can practice the use of statistical tools by solving tasks on the computer under instruction.

Responsible:

Lecture and biometry seminar: PD Dr. rer. nat. Bernhard Haller: bernhard.haller@tum.de

Medical informatics lecture: Dipl.Phys. Andreas Enterrottacher: andreas.enterrottacher@tum.de

Epidemiology central exercise: Dipl. Stat. Birgit Waschulzik: birgit.waschulzik@tum.de

QB0011 Cross-sectional Course in Imaging Techniques, Radiation Treatment, Radiation Protection

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	56.5

Description of coursework units and examinations:

This subject consists of a lecture and a seminar.

Examination: MC written exam at end of semester

Intended learning outcomes:

The students should develop a profound understanding for the fundamentals and applications of imaging techniques in medicine. This includes knowledge about different technologies like MRT, CT, and nuclear medical methods, as well as their physical fundamentals and device technology. In addition, students will gain a deeper understanding of the role of imaging in the diagnosis and treatment of various diseases, particularly in radiation oncology. The students learn to critically assess and apply diagnostic and therapeutic strategies. A particular focus is on radiation protection and the safety aspects during use of radiological techniques.

Content:

- Introduction, imaging, radiation protection
- Introduction to therapy possibilities of radiation oncology
- Fundamentals/radiation physics/radiation protection
- Fundamentals of MRT
- Physical fundamentals incl. device technology, radiation protection, radiation types
- Nuclear medical device technology
- Skeleton radiology
- Radiation biology: tumor and normal tissue
- Radiopharmaceuticals/molecular imaging
- Thorax diagnostics
- Liver and pancreas and GI
- Conventional radionuclide diagnostics/therapy I
- Conventional diagnostics for GIT; introduction to mammography diagnostics
- Lung cancer
- Thyroid: diagnostics/radioiodine therapy
- Retroperitoneum organs
- Prostate carcinoma
- Radionuclide diagnostics for central nervous system
- Abdomen CT diagnostics
- Breast cancer
- Nuclear cardiology
- Angiography
- Brain tumors, skull base tumors
- PET/CT and PET/MR diagnosis of oncological diseases
- Cardiovascular imaging
- Head-neck tumors
- New radionuclide therapies: radioimmunotherapy/receptor therapies, SIRT
- Neuroradiology
- Gastrointestinal tumors II: esophagus/rectum/anal
- Conventional radionuclide diagnosis/therapy II

Teaching and learning method:

Lecture. You will find the lecture slides on mediTUM.

Work on lecture material, discussions, and image diagnosis exercises in the seminar.

Responsible:

Radiology: Dr. Georg Feuerriegel: georg.feuerriegel@tum.de

Interventional radiology: Dr. Tobias Geith: tobias.geith@tum.de

Neuroradiology: Dr. Dominik Sepp: dominik.sepp@tum.de oder lehre-neuro.rad.med@tum.de

Nuclear medicine: Michael Gammel: m.gammel@tum.de

Radiotherapy: PD Dr.med. Jan Peeken: Jan.Peeken@mri.tum.de, deputy Dr. med. Lukas Etzel:

lucas.etzel@mri.tum.de

QB0003 Cross-sectional Course in Health Economics, Health System, Public Health Care

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	18

Description of coursework units and examinations:

Lecture in QS3: Health economics, health system, public health care
10 hours

Lecturers: Dr. Bernhard Riedl

Examination: Multiple choice written exam at the end of the semester

Intended learning outcomes:

- What is public health (overview, know key issues, how can you find out more)?
- What evaluation forms are there in the health economy? (Know the four healthy economy study types and be able to explain them using examples)
- What are costs, how can they be distinguished and how can they be charged (definition, examples, application in clinical and health economy area)?
- What contribution does the quality of life make in the health economy evaluation (examples, applications)?
- Case study (in-depth discussion of a health economic evaluation based on a specific example case, discussion of problems and implementation of health economic studies). It should be possible to apply the discussed health economic concepts to a specific example case.
- Hospital financing (DRG): Students should acquire fundamental knowledge of the form of financing currently used in German hospitals. Furthermore, they should gain an initial overview of the international situation by looking at several selected countries.
- Professional associations – accident insurance in the healthcare sector (overview, principle, familiarization with the special procedures in accident insurance, sources of information)

Content:

Lecture content:

- Introduction and basic terms
- System comparison of state and private health insurance providers
- State and private health insurance providers
- Case study: varicella
- Prescribing medication, remedies, and aids
- EBM, quality management, nursing care insurance, health care proxy
- Economics of hospital system
- General practitioners in Germany

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM.

Responsible:

Dr. Bernhard Riedl: bernhard.riedl@tum.de

QB0004 Cross-sectional Course in Infectiology, Immunology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	20.5

Description of coursework units and examinations:

Infectiology lecture with examination: MC written exam at end of semester
Participation in vaccination internship day
Active participation in the Hygiene Basic and Hygiene Advanced courses

Intended learning outcomes:

Students acquire a sound knowledge of infectiology and clinical microbiology in order to effectively diagnose and treat infectious diseases. They develop practical skills in vaccination and gain an in-depth understanding of hygiene standards in clinical environments. In addition, they learn how to deal with problematic germs in hospitals and understand the importance of preventing and controlling infections, especially in immunocompromised patients.

Content:

- Infectiology and clinical microbiology in practice
- Introduction: infectiology and clinical microbiology in practice
- Peritonitis/sepsis
- Problematic germs in hospital
- Joint/bone/soft tissue infections; hygiene for operations
- HIV infection
- Iatrogenic immune suppression
- Respiratory infections
- Pediatric infectiology
- Urological infectiology
- Gynecological infectiology
- Vaccinations

Teaching and learning method:

Lecture. Internship day with practical exercise for vaccination and discussion of significance of vaccination in practice. Basic and Advanced Hygiene: applied training course on clinical hygiene standards.

Responsible:

Lecture: Dr. Veit Buchholz: veit.buchholz@tum.de

Vaccination internship day: Dr. Roggendorf (hedwig.roggendorf@tum.de)

Basic and Advanced Hygiene: Kathleen Lindemann: kathleen.lindemann@tum.de, Prof. Dr. Rainer Burgkart: rainer.burgkart@tum.de

QB0005 Cross-sectional Course in Clinical-Pathological Conference

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	7.75

Description of coursework units and examinations:

This course is made up of four components: 3x clinical-pathological conference, 1x surgical conference.

This course looks at the macroscopic investigation of different resection specimens that are encountered in daily pathological work. It is designed to teach students how to describe and evaluate macroscopic findings, with an emphasis on differential diagnosis and potential pitfalls.

Examination: none

Intended learning outcomes:

In the “Clinical-Pathological Conference”, students learn the skills required for the macroscopic assessment of resection specimens. They are specifically trained in the description and evaluation of macroscopic findings, with a particular focus on differential diagnosis and recognizing pitfalls in pathology. The aim is to develop a deep understanding of the complexity and relevance of pathological findings in clinical practice.

Content:

- Introduction to macroscopic pathology and their significance in clinical medicine.
- Detailed analysis of different tissue samples, with a focus on the recognition of characteristic features and pathological changes.
- Methods for distinguishing between different pathological states based on macroscopic findings.
- Identification and dealing with frequent and complex error sources in macroscopic assessment.
- Linking macroscopic findings with clinical information to create comprehensive diagnoses.
- The importance of cooperation between pathologists, surgeons and other medical disciplines.

Teaching and learning method:

Seminar in small groups with oral presentation and discussion.

Responsible:

Dr. med. Alexander Muckenhuber: alexander.muckenhuber@tum.de

Organizational matters: Claudia Walter: c.walter@tum.de

QB0006 Cross-sectional Course in Clinical Environmental Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	5

Description of coursework units and examinations:

Two lecture dates and seminar.

Seminars using in-person format are held as part of the “Cross-section of Clinical Environmental Medicine” seminar. The seminars are in groups of 20 students. Each student actively takes part in the organization of the seminar either as a brief speaker on a partial aspect or as author of a short handout on a partial aspect.

Grade report: graded seminar work.

Intended learning outcomes:

Students can recognize the part played by environmental factors in complex diseases and evaluate the basic principles for (therapy), prevention, or explanation of diseases.

They are familiar with the broad spectrum of environmental medicine questions:

- Harmful effects of individual noxa
 - Contribution of environmental factors to complex diseases
 - Causally incomprehensible clinical pictures with essential components in personality structure and psyche
- They can recognize the varying conclusiveness of different (e.g. experimental or epidemiological) approaches and are familiar with the various basic principles of different systems for setting limit values.

Content:

Lecture:

- Clinical environmental medicine - introduction to topic
- Toxicology from a clinician’s view

Seminar:

- Fine particulates
- Nitrous gases/NO₂
- Food: additives and health-promoting ingredients
- Conflicts of aims and solution strategies when using cholinesterase inhibitors for protection of plants

Teaching and learning method:

Lecture and seminar with group work.

Responsible:

Prof. Dr. Martin Göttlicher: martin.goettlicher@helmholtz-muenchen.de

QB0008 Cross-sectional Course in Emergency Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	33

Description of coursework units and examinations:

Courses offered:

1. Emergency medicine lecture
2. Emergency medicine practical course
3. Training course on Basic Acute Danger to Life and Advanced Acute Danger to Life

Examination: Written exam at the end of the third semester with 30 to 40 MC questions (minimum passing score 60%), repeat exam one semester later.

Intended learning outcomes:

Emergency medicine practical course:

Learning objective/keywords: Upon completing the emergency medicine internship, students should be familiar with the procedure for basic life support (BLS) for adults and children and advanced life support (ALS) for adults. They should also be able to perform the related manual tasks.

Content:

1. Lecture topics:

Cardiopulmonary reanimation, unconsciousness and airway management, cardiological emergencies, toxicological emergencies, internistic-endocrinological emergencies, gastroenterological emergencies, respiratory disorders, acute abdomen, ophthalmological emergencies, neurological emergencies, polytrauma, gynecological emergencies, traumatological emergencies, pediatric emergencies

2. Emergency medicine practical course:

Concept/contents: The practical course in emergency medicine comprises three teaching units each lasting 120 mins:

Teaching unit 1: Repeat of BLS algorithm, work on the ALS algorithm, learning mask ventilation and intubation on the phantom.

Teaching unit 2: Repeat of ALS algorithm, practice of various reanimation situations in small groups, learning i.v. line techniques in small groups.

Teaching unit 3: Practice of various (more complex) reanimation situations in small groups, learning i.v. line techniques in small groups.

Teaching and learning method:

Lecture and practical course. The lecture slides are available on mediTUM. During the practical course, students repeat and memorize key emergency medicine skills by practicing on models.

Responsible:

PD Dr. Rainer Haseneder, r.haseneder@lrz.tum.de

QB0009 Cross-sectional Course in Clinical Pharmacology, Pharmacotherapy

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.00	19.5

Description of coursework units and examinations:

Lecture two days per week in third clinical year

Examination: at the end of the winter semester, 50 MC questions and one prescription task (three prescriptions need to be written correctly).

Intended learning outcomes:

The students acquire sound knowledge of clinically relevant pharmacotherapies and their use in medical practice. They learn to safely and effectively prescribe medicaments for treating illnesses like hypertension, cardiac insufficiency, diabetes and neurological disorders. The students will be able to decide critically about the selection and dosing of medicaments, assessing the risks and benefits in the process and taking individual patient needs into consideration.

Content:

Lecture topics:

- Hypertension
- Coronary heart disease, lipid-lowering medicaments
- Cardiac insufficiency, cardiac arrhythmia
- Anti-diabetic drugs
- Calcium metabolism, osteoporosis
- Thyroid hormones, gout
- Antiparkinson drugs, anticonvulsants (antiepileptic drugs)
- Psychotropic medicaments, antidementia drugs
- Cytostatics
- Analgesics, antirheumatics
- Stomach/intestines
- Therapy during pregnancy
- Adrenal hormones, anti-asthmatic drugs
- Prescription

Teaching and learning method:

Lecture. You will find the lecture slides on mediTUM.

Responsible:

Dr. Andrea Lang: andrea.ahles@tum.de

QB0010 Cross-sectional Course in Prevention, Health Promotion

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	11

Description of coursework units and examinations:

Active participation in lecture.

Examination: MC written exam at the end of the semester.

Intended learning outcomes:

Students acquire extensive knowledge of prevention strategies and health promotion. They learn the basics of prevention, including relevant definitions, measures and laws, and apply this knowledge to specific areas such as the prevention of cardiovascular and tumor diseases, smoking and addiction prevention, as well as obesity prevention among children and adolescents.

Content:

- Introduction to prevention: definitions, measures, laws
- Prevention of cardiovascular diseases
- Diet as part of preventing cardiovascular disease
- Practical implementation of prevention measures related to physical activity and diet
- Performance diagnostics + exertion level in fitness sports
- Training with cardiovascular risk factors (HC, diabetes I/II, HTN)
- Prevention of tumor diseases I
- Prevention of tumor diseases II
- Smoking prevention
- Prevention of addiction
- Obesity prevention in children and adolescents
- Vaccination
- Prevention of sudden cardiac death
- Summary and practical, interactive examples

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM.

Responsible:

Dr. Mario Weichenberger: Mario.Weichenberger@mri.tum.de

Michaela Kaiser: Michaela.Kaiser@mri.tum.de

QB0012 Cross-sectional Course in Rehabilitation, Physical Medicine, Complementary Therapeutic Procedures

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	10.5

Description of coursework units and examinations:

Active participation in lecture.

Examination: MC written exam at end of semester

Intended learning outcomes:

Students acquire sound knowledge in the fundamentals of rehabilitation and physical therapy. They understand the specific rehabilitative approaches for neurological disorders, psychosomatic illnesses, myocardial infarction, diabetes mellitus, and endoprosthetics. In addition, they learn how to use phytotherapy and about the importance of individual health management in the context of modern naturopathy.

Content:

- Fundamentals of rehabilitation and physical therapy
- Rehabilitation therapy approaches with neurological disorders
- Rehabilitation in psychosomatics with chronification of physical diseases
- Rehabilitative therapeutic approaches for myocardial infarction and diabetes mellitus

- Rehabilitation in endoprosthetics
- Phytotherapy
- Individual health management as modern natural medicine

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM.

Responsible:

Prof. Rainer Burgkart: rainer.burgkart@tum.de

QB0013 Cross-sectional Course in Palliative Care

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	3.00	20

Description of coursework units and examinations:

Participation in the Doctor-Patient Conversations 1 seminar, Palliative Care seminar, the Palliative Care internship, and the lecture.

Examination: MC written exam, in addition students should write an essay on palliative care. The essay is graded.

Intended learning outcomes:

In this subject, students acquire comprehensive knowledge of and practical skills in palliative care. They learn how to effectively implement palliative symptom management and develop skills in doctor-patient conversations through practical exercises in simulated patient consultations.

Content:

- Palliative symptom management
- Doctor-patient conversations in palliative care
- Special challenges

Teaching and learning method:

Doctor-patient conversation seminar: Practical exercises for conversation situations in palliative care using simulated patient conversations with simulated patients. Discussion and reflection on lecture content in the palliative care seminar.

Responsible:

Seminar ÄGF 1: PD Dr. Andreas Dinkel andreas.dinkel@mri.tum.de, course coordination: Kathleen Lindemann kathleen.lindemann@tum.de

Palliative care seminar: Prof. Dr. Johanna Anneser: j.anneser@tum.de

Palliative care internship day: Prof. Dr. Johanna Anneser: j.anneser@tum.de

Lecture: Prof. Dr. Johanna Anneser: j.anneser@tum.de

QB0007 Cross-sectional Course in Medicine of Aging and the Elderly

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	12

Description of coursework units and examinations:

Lecture: 16 hours every semester, third academic year
Examination: Written exam at the end of each seminar: 30 MC questions

Intended learning outcomes:

Students should acquire fundamental knowledge of the medical aspects of aging and the treatment of elderly people. This includes understanding geriatric fundamentals, identifying and treating age-specific conditions such as immobility, frailty, osteoporosis, and dementia, and adapting pharmacotherapy to the needs of older patients. The aim is to prepare future doctors for the special challenges involved in caring for older patients and to raise awareness of age-related changes in various areas of medicine.

Content:

Lecture topics:

- General geriatric fundamentals
- Immobility and frailty in old age
- Treatment of fractures/osseous metastases
- Special gynecological factors in old age
- Special urological factors in old age
- Ability to drive safely in old age
- General pharmacotherapy in old age
- Special pharmacotherapy in old age
- Special dermatological factors in old age
- Gastroenterological illnesses in old age
- Treatment of chronic wounds
- Diet in old age
- Diseases of the lungs and airways in old age
- Osteoporosis
- Dementia, delirium, acute confusion, transition syndrome

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM.

Responsible:

PD Dr. Dr. med. Alexander Zink (alexander.zink@tum.de)

QB0014 Cross-sectional Course in Pain Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	6

Description of coursework units and examinations:

Lecture on pain medicine.
Examination: MC written exam at the end of the semester.

Intended learning outcomes:

Students

- Understand the fundamentals and different forms of pain, including acute pain, tumor pain, and neuropathic pain.
- Develop the ability to analyze pain medicine problems and discuss treatment approaches by working on case studies.
- Are able to apply pain medicine concepts in clinical practice.

Content:

- Introduction to and fundamentals of pain medicine
- Psychosomatic fundamentals
- Acute pain
- Tumor pain
- Neuropathic pain
- Head and face pain
- Case discussions
- Back pain

Teaching and learning method:

Lecture. The lecture slides are available on mediTUM.

Responsible:

Prof. Dr. Thomas Tölle: thomas.toelle@tum.de

BP0001 Block Internship in Internal Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	4.00	40.5

Description of coursework units and examinations:

The Internal Medicine block internship comprises one week of courses in different departments including seminars, and three internship days. The block internship is staged at the beginning or at the end of the semester in the summer or in the winter.

Examination: OSCE (at end of block internship, third clinical year)

Intended learning outcomes:

- 1.) Students know the main risks/complications of the transfer of blood products (iron overload, transmission of HIV/hepatitis, contamination with bacteria, hyperkalemia from improper storage, hemolytic transfusion reactions, non-hemolytic febrile transfusion reactions, anaphylactic transfusion reactions, ...)
- 2.) Students can fill in the transfusion protocol completely and correctly. This includes the professional performance and evaluation of the bedside test.
- 3.) Students can set up and write a 12-channel ECG for a patient correctly by themselves.
- 4.) Students correctly determine the rhythm, frequency, position type, intervals, signs of hypertrophy, atrial enlargement, R progression via the anterior wall, and signs of ischemia via different territories of the posterior/lateral and anterior wall on an ECG and reliably distinguish normal findings from pathological findings.
- 5.) The information for the specific patient case can be listed and analyzed using SOAP notes.
- 6.) A differential-diagnostic list is created independently using the information available and a work hypothesis is formulated.
- 7.) Students can independently work on the diagnostic and therapeutic procedure and phrase it in an appropriate form.
- 8.) Students can present the results in free spoken form, also to a head doctor or senior doctor, in an orderly and technically correct manner.
- 9.) Students can orientate themselves in the curve of an internal medicine patient and read key information such as vital signs, long-term medication, medication on demand, information for the doctor, etc. 10.) Students can assess the vital parameters of a patient as normal or pathological.
- 11.) Students can comprehend reasons for medication switches and check whether they make sense.
- 12.) Students can analyze a medication plan for possible interactions between the individual preparations.
- 13.) Students know various sources from which they can learn about the effects and indications of medication. They can use them in the specific example for gathering information.
- 14.) Students recognize relationships between the clinical state of the patient, diagnostic procedure, and therapeutic action, and can check whether they make sense.

15.) Students can issue a prescription for several drugs correctly and completely, and prescribe the right package size.

Content:

Ward work on different wards for internal medicine, ECG course, sonography course, hematology course, and endoscopy course, and senior doctor case discussions.

Teaching and learning method:

Block internship in the clinic. Students learn doctor skills during the clinic work.

Responsible:

Dr. Folker Schneller: folker.schneller@tum.de

BP0002 Block Internship in Surgery

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	6.00	63

Description of coursework units and examinations:

All surgical departments (general and visceral surgery, trauma surgery, orthopedics, neurosurgery, plastic surgery, vascular surgery and oral and maxillofacial Surgery) take part in the block internship, which gives participants the opportunity to experience surgery in practice over two weeks.

The block internship involves 80 academic hours of in-person courses in small groups and seminars, an online vhb course and a final examination in OSCE format (35 min examination).

In detail, the in-person courses for the surgery block internship include the following seminars and small group lessons:

1. 5 x 4.6 hours of general surgery seminars:

- a) Suturing techniques
- b) Osteosynthesis
- c) Plaster and bandaging techniques
- d) Anastomotic techniques
- e) Complete physical examination: Orthopedics, sport orthopedics, abdomen and thorax surgery, neurosurgery.

2. 4 x 4 hours small group lessons on ward: ward management with

- a) preoperative management: Admission examination, functional diagnostic confirmation, medication, etc.
- b) Operation explanation
- c) Postoperative management: medication, drainage, mobilization, enteral administration, antibiotic treatment, etc.
- d) Post-operative complications: symptoms, diagnosis, therapy
- e) Letter to patient's doctor, discharge management

3. 4 x 6.6 hours of operations and functional areas (consultation hour or special examinations)

4. 5 x 2.6 hours of special surgery seminars:

- a) Maxillofacial surgery
- b) Neurosurgery
- c) Surgical endoscopy and laparoscopy
- d) Heart surgery
- e) Vascular surgery

Examination: OSCE on last day of block internship

Intended learning outcomes:

The block internship is intended to provide a general, practical overview of the entire field of surgery and the surgical procedure, and is integrated into the third year of study.

Content:

- Stitching/knot studies
- Physical examination
- Plaster/bandage
- Osteosynthesis
- Anastomosis
- Heart surgery
- Neurosurgery
- Vascular anastomosis
- MCG osteosynthesis
- Accident surgery
- Laparoscopy

Teaching and learning method:

Block internship in the clinic. Students learn doctor skills during the clinic work.

Responsible:

Prof. Ralf Gertler: ralf.gertler@tum.de

BP0003 Block Internship in Pediatrics

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	34.25

Description of coursework units and examinations:

The one-week Pediatrics block internship takes place at the Schwabing Children's Hospital, Gaißach Specialist Clinic, Department of Congenital Heart Disease – Pediatric Cardiology at the German Heart Center Berlin or optionally in Passau, as well as in a pediatric practice, at the Children's Center (social pediatrics) and in a neonatal department (Dritter Orden Children's Clinic Munich, Red Cross Clinic or Rechts der Isar Hospital).

Intended learning outcomes:

Students develop comprehensive practical skills in pediatrics, including the examination of newborns, premature babies, infants, and schoolchildren. Through direct patient care and regular case presentations, they learn to analyze and present clinical cases independently. The aim of the internship is to familiarize students with the daily routine of a pediatric ward and to teach them basic doctor skills in the field of pediatrics.

Content:

The focus is on practical exercises at the bedside (small group lessons: examination of a newborn, examination of a premature baby, examination of a small child, examination of a schoolchild, neurological examination, reanimation training; ward internship: allocation of own patient, who is then presented at the end of the week as part of the case presentation. Getting to know everyday ward work). There are also interactive seminars from the lecturers' areas of specialization.

Teaching and learning method:

Block internship in the clinic. Students learn doctor skills during the clinic work.

Responsible:

BP0004 Block Internship in Gynecology

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	30.5

Description of coursework units and examinations:

The course teaches practical application in gynecology and obstetrics.

Block internship (1 week) in third clinic academic year

Examination: OSCE at end the block internship (pass mark 60%)

Intended learning outcomes:

Students should acquire basic practical skills in gynecology and obstetrics on this block internship. The aim is to provide an insight into various areas such as the ward, operating theater, and delivery room, and to teach clinical working techniques. By participating in seminars and practical exercises, students will learn how to perform gynecological examinations and understand the mechanics of childbirth. The successful completion of the OSCE at the end of the internship demonstrates the competencies acquired.

Content:

Block internship – concept & contents

Block internship: one week full-day, structured internship in the gynecological clinic with insight into various areas (ward, operating room, delivery room, etc.), seminars on gynecological examination and birth mechanics, among other things, also take place as part of the internship.

Please note: all block internships (gynecology, pediatrics, internal medicine, surgery, family medicine, psychiatry) take place in the first and last three weeks of each semester as regular third year courses. If subjects from the first or second year are taken, there may be overlaps.

Teaching and learning method:

Block internship in the clinic. Students learn doctor skills during the clinic work.

Responsible:

Contact person/course coordinator:

Dr. med. Evelyn Klein (evelyn.klein@tum.de)

PD Dr. Bettina Kuschel (bettina.kuschel@mri.tum.de)

Markus Tarrach (markus.tarrach@tum.de)

BP0005 Block Internship in Family Medicine

Level:	Language of instruction:	Credits:	Total hours:
Medicine (clinical)	German	2.00	80

Description of coursework units and examinations:

Block internship: After attending the introductory seminar, students complete the digital case studies on their own. The students can then make use of and build on what they have learned for nine days under supervision in teaching practice. Particular attention is to be paid to the conduct of doctor-patient conversations, the tasks and functions of family doctors and frequent reasons for consultation.

Examination:

1. Proven participation in the introductory seminar
2. vhb certificates after successful case processing
3. Grading and assessment by the teaching doctor

Intended learning outcomes:

Students learn core competencies from the family doctor expert (CanMEDS Family Medicine): successful communication, good cooperation, manager, patient advocate, lifelong learning, professional medical attitude

Content:

Work fundamentals in family medicine

- Unselected patient collective
- Frequent consulting problems
- Experienced anamnesis
- Biopsychosocial model

Dealing with diagnostic uncertainty

- Classification
- Shared responsibility
- Wait-and-see approach
- Red flags
- Evidence-based medicine
- Guidelines (NVL, DEGAM, AWMF, etc.)
- Acute medical complaints

- Respiratory infections, abdominal pain, chest pains, back pain, and headaches, dyspnea, fatigue, weakness, fall, collapse, fever, allergic reaction, swelling of the lymph nodes, wound care, and basic surgery, etc.

Long-term care of patients

- Chronic diseases like diabetes mellitus, CHD, bronchial asthma / COPD (DMP programs)
- Mental and psychosomatic disorders
- Pain therapy and palliative medicine
- Addiction problems

Long-term care of elderly patients

- Home visits, nursing home visits
- Dementia
- Medication for the elderly
- Geriatric basic assessment

Prevention

- Health examinations
- Vaccinations

Teaching and learning method:

1. 2.5 h introductory seminar
2. 2 vhb modules, each with 16 learning cases
3. 9-day block internship

Responsible:

Dr. med. Dipl. oek. Bernhard Riedl (riedl-bernhard@t-online.de)
