

Short descriptions of courses from students' perspectives

(Summary is written by the „Fachausschuss“ Master Medical Immunosciences and Infection_27th_04_2022)

First semester:

- Infection I:
 - Infection I is separated in a virology, microbiology, and parasitology part. The course introduces basic concepts of infectious diseases and covers major human illnesses of the categories, including some molecular mechanisms, immunology, symptoms, and treatment. It includes microscopy of sample slides and student presentations on the discussed topics.
- Methods course
 - The course gives a theoretical background of common techniques and methodological approaches from the area of life sciences. It also focuses on different types of statistics test and data presentation. The aim is to improve the student's skills in statistical calculations and adequate planning of experiments.
- Immunology I
 - The aim of this course is to understand the necessary and sufficient conditions to mount an immune response. It starts with the evolution of the immune system from bacteria to higher vertebrates and then focuses on cellular and humoral components of the innate immunity. Basic principles of immune responses such as antimicrobial peptides, effector functions of immune cells, as well as molecular patterns and their receptor signaling are described.
- Clinical immunology and Immunopharmacology I
 - This course introduces in detail immunological characteristics of specific organs and their diseases. The course also includes a self-learning part of anatomy, depending on each student's previous knowledge. It consists of several parts:
 - **Immune diagnostics** gives an introduction into diagnostic techniques and parameters used in the clinic and research.
 - **Immunopharmacology** covers basic pharmacological concepts of importance in immunological research and clinics.
 - **Systemic immunopathophysiology and Immunophysiology and Immunopathology of specific organs** deal with anatomy and physiology of different organs and systems, focusing on the Immune cells that play major roles in each one of them. They also focus on the causes, symptoms, and treatment of organ/system-specific inflammatory and immune-mediated diseases.
- Second semester:
 - Infection II
 - Infection II is the course following up on Infection I and is also separated in virology, microbiology, and parasitology, but focusing on more specific and medical aspects of those fields. In virology it focuses on antiviral therapy and viral diseases; microbiology focuses on molecular mechanisms of pathology; parasitology focuses on

different kinds of parasites. Additionally, it gives a basic introduction into hygiene.

- Regulations and legal aspects in life sciences
 - This course deals with regulations and legal aspects that are the basis for research in life sciences. It introduces important concepts, rules, and laws for scientific work, drug development, clinical trials, and biosafety.
- Immunology II
 - As the consecutive course of Immunology I, this course focuses more on adaptive immunity, specifically on B and T cells. It describes the molecular mechanisms of lymphocyte development, cell-cell interaction, receptor signaling and subsets. Papers for each topic are also presented and discussed in the group to gain knowledge on the relevant methodology applied in the field of immunology.
- Clinical immunology and immunopharmacology II
 - This course focuses on tumor immunology and autoimmune diseases, covering basic concepts, molecular pathomechanisms, and treatment options in general and for specific diseases of these fields.
- Research ethics and scientific writing
 - This course consists of a separate part on research ethics taught by the German Reference Center for Ethics in the Life Sciences (DRZE)/Institute of Science and Ethics (IWE). It introduces basic ethical concepts and their application to current research questions. The second part on scientific writing focuses on conveying writing skills that are important for writing papers and protocols and general rules for clear writing.
- Third semester:
 - The third semester is free of lectures, giving time for 2 lab rotations with 8 weeks each. Afterwards, the research and results obtained in the lab have to be summarized in a report and presented in a meeting with the two examiners.
Lab rotations can be performed in other German labs or abroad but Bonn itself also offers a multitude of various high-level research opportunities.
- Fourth semester:
 - The last semester is planned to be used for the master thesis.
- Electives:
 - Immuno-oncology
 - The goal of this course is to understand the various determinants of anti-tumor immune responses and how this knowledge could be used to improve cancer immunotherapy. The course will start with a general introduction and overview of the basic concepts and treatment strategies currently used in the clinic. This elective seminar course is based on student presentations of papers from the field of immuno-oncology and their discussion in the group. It conveys a thorough understanding of basic concepts in tumor immunology and immunotherapy of cancer, as well as experimental methodologies to assess it.
 - Immuno-metabolism

- Immunometabolism is an emerging field incorporating cellular metabolism and immune function. A general introduction and overview of the topic is provided, but this elective seminar-course is based on student presentations of papers from the field of immunometabolism and their discussion in the group. It conveys a thorough understanding of basic concepts and techniques used to study immuno-metabolism. The aim of this course is to understand the impact of cell metabolism on immune responses and how this knowledge could be used to manipulate immune responses and treat diseases.
- Nucleic acid recognition
 - This seminar will help you deepen your understanding of how the molecular mechanisms of nucleic acid recognition in terms of innate immunity work. It is based on student presentations for which you can choose from a wide variety of papers, often about the discovery or closer description of the nucleic acid sensing structures. If the presentations cannot fill the complete semester, the lecturer prepares some current literature for the students to discuss them regarding specific questions. Based on this, you get a chance to have a closer look on related data and how to interpret them - a nicely interactive course.
- Challenges in Medical Immunosciences
 - In this lecture series, various tutors will give an overview about the current situation in their field of immunology-related research, state of the art techniques and new developments. Some topics have been Inflammasome, nucleic acids sensing, nanobodies, allergy and immuno-oncology. As 15 study-independent lectures have to be visited, these talks are a great opportunity to get to know various topics you are interested in.