Postgraduate opportunities: 2017

HonsBSc – Molecular Biology *or* HonsBSc - Human Genetics, and MSc and PhD programmes

in the
DIVISION of MOLECULAR BIOLOGY & HUMAN GENETICS,
STELLENBOSCH UNIVERSITY,
FACULTY OF MEDICINE AND HEALTH SCIENCES,
TYGERBERG CAMPUS

The **Division of Molecular Biology and Human Genetics** of the Stellenbosch University Faculty of Medicine and Health Sciences utilises expertise in molecular biology, biochemistry, microbiology, genetics and immunology to pursue cutting-edge health-related research, particularly relating to tuberculosis and genetically inherited disorders. We enjoy much active national and international collaboration, and there are opportunities for senior students to attend conferences or to go for study visits to international laboratories.

The **Honours BSc in Molecular Biology *or* Human Genetics programmes** are structured to allow the student active participation in one of the research programmes of the Division. At the same time a series of lectures and meetings covers current aspects of molecular and cellular biology and biotechnology, with an emphasis on our research fields. Applications for HonsBSc will be considered from graduates with MBChB or a suitable BSc degree with a minimum 60% overall average in major subjects such as Biochemistry, Pharmacology, Genetics, Microbiology, or Biotechnology.

Enquiries:

HonsBSc (Molecular Biology)
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HonsBSc (Human Genetics)
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The **MSc in Molecular Biology *or* Human Genetics and the PhD programmes** are entirely research-based and students from various backgrounds (e.g. Biochemistry, Pharmacology, Genetics, Microbiology, or Biotechnology) are eligible for consideration.

Enquiries:
Ms Glenda Durrheim, Tel (021) 938 9693 E-mail: gad@sun.ac.za,
Or one of the principal investigators listed below,
Or the head of the division: Prof Gerhard Walzl: Telephone: (021) 938-9158 E-mail: gwalzl@sun.ac.za

We encourage aspiring students to apply for bursaries from the SAMRC, NRF, University or other sources as soon as possible, as the closing dates for applications are often in August or September. **Bursaries may also be supplemented or provided** by the Division in the various research areas listed below.

Applications:
Current SU BSc can apply online at **http://www.mymaties.com**
External students can apply online at **http://www0.sun.ac.za/pgstudies/**

RESEARCH PROGRAMMES:

1: Genetics of Human Susceptibility to Tuberculosis: Our research group is investigating the genetic causes of susceptibility of some individuals and populations to Tuberculosis. Association studies on our existing DNA bank will involve genotyping and investigation of polymorphisms in promising candidate genes and, in some cases, following up on functional aspects. (Prof Eileen Hoal; egvh@sun.ac.za)

2: Drug resistance in Tuberculosis: A dramatic increase in resistance and the spread of MDR- and XDR-TB has been observed which raises the possibility of a future epidemic of virtually untreatable TB. This project uses Molecular Biology techniques (DNA fingerprinting, mutation analysis, genomics, proteomics, whole genome sequencing, together with data from patients) to understand the mechanisms and disease dynamics of drug resistant TB. (Dr Elizma Streicher; lizma@sun.ac.za)

3. Molecular epidemiology of Tuberculosis: Molecular epidemiology of Tuberculosis allows the researcher to gain insights into the disease dynamics of the epidemic and thereby influence the design of control strategies. This study has a special emphasis on the evolution of the pathogen enabling the identification of pathogenic mechanisms and their interactions with the host. (Prof Gian van der Spuy gvds@sun.ac.za and Prof Rob Warren; rw1@sun.ac.za)

4. Host-pathogen mycobactomics: Our research exploits data-rich methodologies such as whole genome sequencing, transcriptomics and proteomics, underpinned by computational approaches. Specific research areas include: (a) TB host-pathogen interactions, with a focus on persistent mycobacteria, (b) biology of drug resistant strains of *M. tuberculosis*, and (c) PE/PPE proteins of mycobacteria. (Prof. Samantha Sampson; ssampson@sun.ac.za)

5. Drug development: There is a need for new drugs to combat the burden of tuberculosis disease. With molecular biology techniques, our research group attempts to identify new potential drug targets in *M. tuberculosis* for possible drug intervention. At present the group is concentrating on unique control mechanisms in the nitrogen metabolism of *M. tuberculosis*. The group also tests new compounds against tuberculosis. (Dr Ian Wiid; iw@sun.ac.za)

6. Bioinformatics: Because researchers are incorporating systems biology techniques into a widening variety of experiments, the need for researchers skilled in bioinformatics is growing more pressing. The South African Tuberculosis Bioinformatics Initiative (SATBBI) seeks trainees at Honours, Masters, and Ph.D. for work in automated analysis for flow cytometry, proteomic identification, high-throughput sequencing analysis, and machine learning applications. www.sun.ac.za/bioinformatics (Prof David Tabb; dtabb@sun.ac.za and Prof Gerard Tromp; gctromp@sun.ac.za)

7. Immunology: We are investigating immune responses in different clinical forms of Tuberculosis to define appropriate and inappropriate host responses. In these studies histological, flow cytometric, cell culture and other basic immunology techniques are employed. We are also setting up mouse models of tuberculosis infection, where the emphasis of our work is the effect of co-existing unrelated infections, like gastro-intestinal worm infestation, on mycobacterial control. (Prof Gerhard Walzl; gwalzl@sun.ac.za)

8. Genetic susceptibility to psychiatric disorders: We use molecular genetic approaches to identify genetic susceptibility factors that predispose individuals to developing psychiatric disorders with an anxiety component, for example obsessive compulsive disorder, using a variety of genotyping techniques and statistical analyses. (Dr Sian Hemmings; smjh@sun.ac.za)

9. Parkinson's disease: Our group focuses on the genetic aetiology and disease mechanisms underlying Parkinson's disease, a common and debilitating neurodegenerative disorder. In our research we use cutting-edge methodologies including whole exome sequencing, targeted resequencing, and perform functional studies on *ex-vivo* patient-derived tissues and neuroblastoma cell lines (Prof Soraya Bardien; sbardien@sun.ac.za)

10. Veterinary Tuberculosis: The Animal TB research program explores TB in natural animal hosts (livestock and wildlife) using a multi-pronged approach incorporating novel applications of molecular biology and immunologic techniques. Our goal is to improve knowledge of TB disease pathogenesis, diagnostic techniques, epidemiology, and disease impact of mycobacterial organisms in a variety of species to understand the implications and role in the ecosystem, and determine impacts of TB at animal-human interfaces. The work incorporates a continuum of basic to applied research. (Prof Paul van Helden; pvh@sun.ac.za, Dr Michele Miller; michelemiller128@gmail.com and Dr Sven Parsons; sparsons@sun.ac.za)