**Samples of projects**

**Type of Project:**

1. **Review**

**Convenor:** Prof. Dele Amosun and Prof. P Reddy (Health Promotion Research Development Group, MRC)

Contact: Dele Amosun, seyi.amosun@uct.uct.ac.za

**No. of students:** 5

**Type:**  Review

**Title:** Epidemiology of tobacco use in Africa – Trends in tobacco consumption

Summary: The worldwide toll of death and disability related to tobacco use is enormous, and tobacco use is spiraling in developing countries. The purpose of the module is to stir up the interest of students in tobacco-related issues from a public health perspective. In this module, students will do a literature search to address the following questions:

How much tobacco is consumed in African countries today?

How many people are smoking, and who is being targeted by the marketing of tobacco products?

A written report will be submitted at the end of the module.

##### Convenor: Vivienne Russell

Contact: Vivienne.Russell@uct,ac,za

Tel. 021 4066243

Title: Attention-deficit hyperactivity disorder

**No. of students:** 4

**Type:** Literature review

Summary: Attention-Deficit/Hyperactivity Disorder (ADHD) is a behavioural disorder that has been suggested to result from impaired higher-order cognitive function and reinforcement processes attributed to structural and biochemical abnormalities in cortical and limbic neural networks innervated by the monoamines, dopamine, noradrenaline and serotonin. Psychostimulant drugs such as methylphenidate (ritalin) provide the most effective treatment, reducing the major symptoms of hyperactivity and impulsivity as well as improving the child’s ability to sustain attention. Children with ADHD are at risk of drug abuse. An important question is whether early treatment enhances or reduces their susceptibility to drug abuse. Critically review the scientific literature and deduce whether drug treatment is truly beneficial to the affected individual in the long-term*.*

##### Convenor: Prof. Dan Stein

Contact: Dan.Stein@uct.ac.za

Title: The Neural Correlates of Blushing and fMRI

**No. of students:** 2 (both students must be male as the research subjects are female and

 the research protocol requires females to blush in the presence of males)

**Type:** Review

Summary: Blushing is a physiological response to emotional stimuli, caused by the vasodilation of cutaneous blood vessels. This response is typically associated with the social, self-conscious emotion of embarrassment and is often a primary complaint of patients diagnosed with social anxiety disorder. Although previous studies have investigated blushing in relation to social anxiety, no study has yet explored the neural correlates of blushing.

In this module the student will observe and assist in scanning participants for a functional neuroimaging (fMRI) study investigating the neural correlates of blushing. This research will be conducted at the Cape Universities Brain Imaging Centre (CUBIC), located at Tygerberg Hospital. The student will be introduced to the fMRI technology, and will learn about its uses in psychological research.

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The student will also write a relevant literature review e.g.) describing the current state of knowledge on the social emotion of blushing and its relevance to social phobia or the current state of fMRI knowledge of social anxiety.

1. **Laboratory study/experimental**

##### Convenor: Dr Alison September, Prof Malcolm Collins

Tel. 6504559

**Title**: Genetic variation: does it influence soft tissue overuse injuries?

No. of students: 2

**Type:** Laboratory

Summary: Specific DNA sequence variations have previously been associated with tendon overuse injuries by researchers at the MRC/UCT unit for Exercise Science and Sports Medicine. DNA from affected (clinically diagnosed) and unaffected individuals have been isolated and are available. In this module the students will work in pairs and investigate known DNA sequence variants within a candidate gene. They will amplify the variant in the affected and unaffected individuals; restrict the products and separate them on agarose gels. They will conduct basic statistical analyses on the data generated and test for association. During the 4th week they will write a report providing a brief introduction on the current literature on genetic variation and the risk for soft tissue injuries; summarise their aims, methods, results and conclusion.

##### Convenor: Dr Aron Abera (E-mail: aron.abera@uct.ac.za) and Prof Arieh Katz (arieh.katz@uct.ac.za).

**Title**: Polymorphisms in the kaposi’s sarcoma-associated herpes virus G protein-coupled receptor gene in South Africans

**No. of students**: 2

**Type:** Laboratory research

**Summary:** Kaposi’s sarcoma-associated herpes virus (KSHV) also called human herpesvirus-8 (HHV8) is the key cause of Kaposi’s sarcoma (KS). KS is the most common AIDS-related malignancy and is one of the most common cancers is several sub-Saharan African countries. KSHV encodes a G-protein-coupled receptor (GPCR), termed vGPCR. The vGPCR is homologous to the human chemokine CXCR1 and CXCR2 receptors which are the cognate receptors for interleukin-8 and is a key molecule in the pathogenesis of Kaposi’s sarcoma and is a target for development of drugs for treatment of Kaposi's sarcoma patients. Although this disease is more prevalent in Africa, only one vGPCR of a viral isolate from an African patient has been sequenced and it was found to differ in two amino acids from the prototype vGPCR of the Northern Hemisphere. In view of the etiological role vGPCR has in this disease, we intend to determine if there is sequence polymorphism in the KSHV vGPCR encoded protein and/or its promoter region found in South African populations and therefore, may have functional consequences on the role of vGPCR in KS initiation and progression in South African populations and render it more pathogenic.

In the first 3 weeks of this project the students will get tissue samples of patients presenting with symptoms of advanced Kaposi’s sarcoma at the Dermatology clinic of Groote Schuur Hospital. The students will isolate viral DNA from the tissue biopsies using the QIAamp DNA kit (Qiagen), followed by nested PCR using two pairs of forward and reverse primers flanking the start and stop codons of vGPCR. The PCR products will then be sequenced, followed by bioinformatic analyses in which these sequences are translated and compared to the published vGPCR sequences. This analysis will indicate whether there is polymorphism in the protein coding region and whether sequence polymorphism results in amino acids changes.

During the 4th week they will write a report, describing their findings and including a literature review on Kaposi Sarcoma and the role of Kaposi’s sarcoma-associated herpes virus (KSHV) in the etiology of this cancer.

##### Module no: 57

##### Contact: Professors Ed Sturrock and Peter Smith

Email: Edward.Sturrock@uct.ac.za and Peter.Smith@uct.ac.za

Tel. 021 406-6312

**Title**: Comparison of two assays for angiotensin-converting enzyme

No. of students: 1

**Type:** Laboratory

**Summary**: The burgeoning clinical importance of angiotensin-converting enzyme (ACE) in cardiovascular and renal disease, and more specifically in hypertension, underscores the need for accurate, sensitive and rapid techniques for measuring the enzyme’s activity in biological fluids and tissue homogenates as well as its purified forms. Furthermore, elevated levels of ACE are associated with active sarcoidosis, and the disease can be diagnosed and followed by measuring ACE activity in plasma, bronchoalveolar lavage fluid and cerebrospinal fluid. In this module the student will compare two methods for determining ACE activity in cell culture medium and purified somatic and testis ACE using well established methods. The one uses the substrate hippuryl-L-histidyl-L-leucine, and the fluorescent adduct of the enzyme-catalyzed product L-histidyl-L-leucine is quantified fluorimetrically. The other method is a kit-based colorimetric method which is carried out on the Abbott Architect 4000 analyser. They will analyse the data generated and write a report providing a brief introduction, their aims, methods, results and conclusions.

##### Convenor: Dr Jeroen Kortsmit

 jeroen.kortsmit@uct.ac.za

 tel: 406 6367

Title: Mechanical testing of biological soft tissue or biomaterial

No. of students: 2 (working together)

Type: Laboratory study

Summary: Computational biomechanics is used to simulate and predict the behavior of healthy and diseased biological tissues. It enables us to develop solutions for clinical problems or prevent those to happen. The mechanical behavior of living tissue is characterized by its mechanical properties. These properties are indispensible for the structural design of medical devices and prostheses, and as an input for computational modeling. Consequently, experiments need to be performed to obtain the desired input parameters.

In this module, the mechanical properties of soft tissue or a biomaterial, for example arteries, veins and PTFE grafts, will be assessed by uni-axial tensile testing. A tensile tester, having a 500N load cell will be used and the stress strain relation of the tissue/material will be determined. From this relation, relevant parameters; elasticity modulus, strength and strain at break of the tissue/material, will be derived.

The module will be finished by writing a report. It will include a theoretical background of the study, the used materials and methods, the results including the correct statistical analyses and a discussion of the outcomes. Preferably, the module will be performed by 2 students at the same time, working together as a team.

Convenor: Dr Andrew Whitelaw

Contact: andrew.whitelaw@uct.ac.za

Tel. 4045282; Division of Microbiology

## Title: IV line infections

Number of students: 2

Type: Interpretive/laboratory-based

Summary This module will allow you to gain insight into the risks associated with presence of an intravenous line in a patient. You will monitor a ward and record details of every patient’s intravenous line. You will also observe the laboratory methods used to attempt to provide clinically relevant information when lines are submitted for culture.

* Monitor IV lines in an ICU and/or on a daily basis for two (or three) weeks.
* Observe how lines are inserted
* Observe how the lines are cared for.
* Learn how to assess for the presence of line infection and record this data for the patients you are following up.
* Learn how the laboratory handles tips of lines that are submitted for culture.
* Do a literature search for attempts that have been made to try and reduce the incidence of such infections.
1. **Survey**

***Cardiothoracic Surgery / General Surgery / Transplant Unit***

**Contact:** Dr Thomas Franz

thomas.franz@uct.ac.za

Tel. 406 6418

**Title**: Retrospective review of arterio-venous access graft procedures performed at

UCT to capture data for the computational assessment of graft performance

**No. of students**: 3

**Type:** Survey

**Summary:**

Arterio-venous (AV) access grafts for haemodialysis are one of the most radicalinterventions on the vascular system, resulting in a five to ten fold increase in flown rate including higher pressure and flow in the vein. More than 50% of AV grafts fail within three years, mainly due to narrowing of the anastomoses and the vein downstream of the graft. Because the use of AV grafts for haemodialysis access is expected to rise, there is significant interest in finding treatments that prevent or reduce these problems. The Chris Barnard Division for Cardiothoracic Surgery, the Division of General Surgery with the Transplant Unit, and the Centre for Research in Computational and Applied Mechanics at UCT have collaboratively embarked on the assessment of the mechanical performance of haemodialysis access grafts using

computational methods. In this module, the student(s) will review clinical records of AV graft procedures performed in the Division of General Surgery and Transplant Unit at Groote Schuur Hospital. All patients currently on dialysis will be included in the study. The student(s) will capture data pertaining to the AV grafts (e.g. implantation site, vessels grafted, graft type, graft dimensions) and demographic patient data (e.g. gender, age, weight). Data that may reveal the patients’ identity will not be collected. The student(s) will then categorize the data captured using suitable parameters, e.g. gender, implantation site, and undertake basic statistical analysis. In the case that more than one student select this module, the students are expected to collaborate on the record review of records and data collection. However, the

students will focus on different aspects during the statistical analysis. The student(s) will complete the module with a report, describing data acquisition, data, statistical analysis and results, and conclusions.

Convenor: G Todd and N Gantsho

Contact: gail.todd@uct.ac.za tel. 4043376

Title: The use of *umthombothi* in dermatology.

Type: Survey

No. of Students: 2-4 students (preferably with own transport)

Summary: Alternate medicines are commonly used by all South Africans. One

product that is commonly used is *umthombothi* which is obtained from an indigenous tree.

During this module students will arrange to interview various members of the public based on a

questionnaire developed by them. They will also investigate the pros and cons of alternate

medicines and develop an understanding of how these products are developed into

conventional medicine therapies.

Convenor: G Todd and G Louw

Contact: gail.todd@uct.ac.za tel. 4043376

Title: Sensory anatomy and physiology and anatomy of smell in the context of perfumery.

No. of students: 2-4 students

Type: Laboratory and survey

Summary: Perfumes have had an important role in society for many reasons

Currently our senses are overpowered by multiple fragrances used at every level of our

activities of daily living. Textile manufacture includes various fragrances which release the

scent on crushing the fabric. In some places of work the environment is

manipulated via the air-conditioning with various fragrances to stimulate appetite, activity and calmness. Fragrances (which include perfumes) are currently the second most common cause of allergic skin disease world wide. In this module, the students will dissect the nerves of smell and will develop an understanding of the physiology of smell. In this context they will suggest what this perfume overload does to smell perception as well as understanding the science of perfumery.

1. **Interpretive**

Module no: 64

Contact: DR Reneva PETERSEN

Tel: R.Petersen2@uct.ac.za/ 082 4162035

Title: CEREBRAL PALSY AND NUTRITION

No of Students: 2

Type: interpretive

SUMMARY: Children with cerebral palsy (CP) frequently have problems with oro-pharyngeal control, oesophageal motility and gastro-oesophageal reflux. Among the consequent health problems of these feeding difficulties are malnutrition, oesophagitis, recurrent chest infections, and progressive lung disease. Children most at risk for these problems are those with spastic quadriplegic and dystonic CP. Students will review the literature regarding Cerebral palsy, feeding problems and malnutrition and will then do an audit of the nutritional state of 100 children attending Cerebral Palsy clinic.

##### Module no: 66

##### Contact: Dr K Pillay (Anatomical Pathology)

Contact: Dr A Alexander (Paediatric Surgery)

Tel. 021 6585209 / 0726226672

Title: Does the intrarenal location of a Wilms’ tumour

reliably predict adrenal gland involvement

No. of students: 2

Type: Interpretive

Summary: Wilms tumour (nephroblastoma) is the commonest renal neoplasm of childhood. They are usually found in children 2-4 years old. When excising these tumours it may not always be necessary to remove the adrenal gland. The aim of this study is determine whether the intrarenal location of the tumour may correlate with adrenal gland involvement. All Wilms tumour reports for the last 10 years will be retrieved from the archives of Histopathology at Red Cross Hospital. The following information will be recorded and correlated: Date of birth, Gender, Stage at excision, Histology (favourable/unfavourable, pathologic stage), laterality, intrarenal location of tumour (upper third, middle third or lower third), presence of renal capsular breach, tumour abutting adrenal gland, renal / adrenal vein involvement and adrenal gland involvement.

Module no: 76

Contact: Dr. Lauraine Vivian

Contact: Prof. Andrew Argent

Contact: Mrs. Claudia Naidu

Tel: 406 6111

Title: Cardiac Surgery in Children

No. of Students: 2

Type: Interpretive

Summary: This project looks at cardiac surgery and intensive care for children in the Red Cross Children’s Hospital. The SSM is part of a medical anthropological research project to understand these children’s socio-cultural backgrounds and physical and psychological well being both before and after surgery. The module requires that students carry out a literature review in the fields of cardiac surgery for children and in medical anthropology. They will participate in ward rounds and carry out informal observations in the intensive care unit. Students will have a one-hour tutorial with Lauraine Vivian each week and will join in the general SSM seminars for those working in the complementary medicine and sports science modules. They will write up a critical analysis of their experience and observations on the ward and/or a literature review and submit this for assessment as per the SSM rules for dissertation.

1. **Case report**

Contact: Dr Claire Warden

Tel: 0214066376; speed dial 76945

Title: Stoma complications

No of students: 2

Type: Case Study

Summary: Intestinal stomas are often a necessity in general surgery but can be particularly troublesome to manage. Stoma complications can have a severe impact on a patient’s quality of life. In this module the student will be required to read recommended background literature on intestinal stomas and complete a literature search on complications of intestinal stomas. The student will be required to accompany the stoma therapist on their rounds for two weeks. The student is expected to document the stoma complications that they observe during that time. If possible, the student will be invited to theatre to observe a stoma being created. They will also be required to report their findings in the form of a power point presentation to the emergency surgical firm on the Tuesday of the 4th week and write up their findings and literature review.

##### Contact: Dr Elma de Vries

Contact: edevries@pgwc.gov.za

Tel. 021-3703700

Title: How helpful are TB sputum investigations in a district hospital?

No. of students: 2

Type: Retrospective folder review

Summary: Many of the patients admitted to Mitchell’s Plain District Hospital have suspected TB, and TB sputum is one of the most frequently requested investigations. Most of the patients are HIV positive, and they often have smear-negative TB. Patients are often discharged before the sputum results are known – do they follow up at the clinic? How helpful are TB sputum investigations in a district hospital setting? This study will review folders of patients admitted to Mitchell’s Plain District Hospital, who had TB sputums done. A list of TB sputums done will be obtained from NHLS Greenpoint. An audit tool to review the folders will be developed by the student with assistance from the supervisor, to include information such as TB symptoms, result of previous TB sputums at the clinic, results of TB sputums taken in hospital, HIV status and CD4 count. A follow-up of patients with positive sputums will be made to see how many of them accessed treatment at the clinic, by contacting the TB clinics telephonically. The student will join ward rounds at Mitchell’s Plain District Hospital to observe how TB patients present and how they are managed. During the 4th week the student will write a report, describing their findings and including a brief literature review of smear-negative TB in HIV.

1. **Construction of a model**

##### Contact: Prof. Graham Louw, Department of Human Biology

Contact: Graham.Louw@uct.ac.za

Tel. 021 406 6302

Title: The Ophthalmotrope

No. of students: 4 (working as a pair)

Type: Model building

Summary: The ophthalmotrope is a mechanical model that demonstrates eyeball motion with contraction of appropriate extrinsic muscles. The first model was built in 1845 by Ruete, and several versions of this model have followed.



The aim of this project is to build a modern version of the ophthalmotrope for use within the Department when students are learning about the actions and testing of eyeball musculature. Students will be required to study the clinical anatomy of the eyeball muscles and to research the biomechanics of the area. It is therefore important for each of the two students to have an interest in the basic principles of mechanical engineering.

Module no: 17

Contact: Prof Graham Louw, Department of Human Biology

(021 406 6302; Graham.Louw@uct.ac.za)

No. of students: 6

Title: Model building in Gross Anatomy

These six students, working in pairs, will be required to build large 3-D models of specific regions of the body. The models will be based on ones that are commercially available, and will be used for teaching and learning in our various undergraduate and postgraduate courses. The students will experiment with, and use, various forms of modeling materials. The regions to be built will be negotiated with students and staff. This is a fun and appropriate way to learn 3-D anatomy!