

**TANZANIA TRAINING CENTRE
FOR
ORTHOPAEDIC TECHNOLOGY**

T A T C O T

**A Short-term Tailored Course on Lower Limb Orthoses/Prostheses for
Orthopaedic Technicians**

TATCOT – KCMC – Moshi, Tanzania

March 2011

Prepared By:

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1 Background.

The Tanzania Training Centre for Orthopaedic Technologists (TATCOT) is a supra regional training center providing education and training in field of orthopaedic technology within and outside Africa. The centre enrolls students from all English speaking African Countries as well as other interested countries.

TATCOT is located In Kilimanjaro Christian Medical Centre (KCMC) which is an institution of Good Samaritan Foundation of the Evangelic Lutheran church of Tanzania and is a consultant and referral medical centre for Northern Zone of Tanzania. The courses offered at TATCOT are accredited and recognized by both the International Society for Prosthetics and Orthotics (ISPO) and the World Health Organization (WHO).

TATCOT is situated approximately 4 km from Moshi town center, 55km from Kilimanjaro International Airport (KIA); 600 km From J K Nyerere Airport Dar es salaam and 430 km from Jomo Kenyata International Airport Nairobi, Kenya. There are many reliable connections from these airports by Taxi or by Bus. For more information please visit our website www.tatcot.ac.tz

1.1 Collaboration with Lower Income Countries:

The centre has had a historical collaboration status with lower income countries for more than a decade particularly in training technical orthopaedic professionals at different levels, i.e. certificate to degree courses. The first initiative was through the German Agency for International Development (GTZ) which is currently referred to as German International Cooperation (GIZ); Deutche Stiftung fur Internationale Weiterbildung (DSE) which was converted into (InWent); World Health Organization (WHO); British Council; MIERIOR; CBM; NORAD; SHIA; Ministry of Health and Social Welfare, Tanzania; 500 Miles-UK; ISPO-LWVF; International Committee of Red Cross (ICRC) just to mention a few which sponsored a number of students at certificate, diploma and degree levels who are currently practicing in different parts of the world.

There has also been a consultation status of technical orthopaedic services which are rendered in different countries, i.e. Zambia, Nigeria, Sudan, Malawi, South Africa, Uganda, Kenya, Vietnam, Cambodia, Indonesia, Thailand, Rwanda, Ethiopia, etc. with the aim of increasing the capacity of rendering and optimizing the services within their respective countries over the years. TATCOT has continued to advice and recommend on training, education and service delivery as well as identifying areas where deficiencies and gaps are evident and provide an expert opinion and guidance on the way forward of attempting to achieve an optimum solution.

2 Strategy of Professional Developments:

Recently, the centre has very often requested by different institutions to establish a formal training course with an objective of acquiring a formal qualification. TATCOT has therefore developed modules of short term courses which would impart appropriate knowledge and skills to a group of technicians so as to improve their assessment, evaluation, prescription, fabrication and fitting skills in orthotics and prosthetics respectively.

2.1 Proposed Short-term Tailored Course:

TATCOT has gone ahead in developing a three month tailored course which is intended to train orthopaedic technicians and impart them with both basic knowledge and skills in Anatomy, Biomechanics, Technology (Workshop and material technology), Workshop Management and different Pathologies pertaining to lower limbs. This course will cover

theoretical and practical part in which each candidate will be required to fabricate at least **four (4) Knee Ankle Foot Orthoses (KAFO)** and **four (4) Ankle Foot Orthoses (AFO)** or the second module in which student will be required to fabricate **four (4) Trans-tibia Prostheses** and **four (4) Trans-femoral Prostheses**.

2.2 Overall Objective:

The overall objective is to impart the Orthopaedic Technicians with knowledge, skills and attitude in order to render an optimal quality of technical orthopaedic services to persons with lower limb neuromuscular-skeletal efficiencies.

2.2.1 Specific Objectives:

The specific objectives are to:

- 2.2.1.1** Acquire the required knowledge, skills and attitude in relevant medical, basic and orthotics/prosthetics science in order to elevate the quality of rehabilitation services rendered to persons with neuromuscular-skeletal deficiencies.
- 2.2.1.2** Acquire the required skills of operating, practicing and handling with different materials, equipments, tools and machines commonly used in technical orthopaedic.
- 2.2.1.3** Acquire managerial skills and building up a team spirit of offering optimum services to clients in need of the rehabilitation services.
- 2.2.1.4** Upgrade the level of the orthopaedic technicians to produce quality **AFO** and **KAFO** or **TT** and **TF** by using thermo- formable plastic and ICRC components.

3 Venue:

The venue of training will be at TATCOT, P. O. Box 8690, KCMC, Moshi, Tanzania

3.1 Time:**2011**

4 Course Fees (Per Person) – same for Lower Limb Orthotics/Prosthetics

The course fee in US\$ is as follows:

Tuition	1,650.00
Books and stationeries	48.00
Uniform	125.00
Hostel rent	300.00
Catering utensils	38.00
Resident permit	120.00
Medical insurance	75.00
Total US\$	2,356.00

5 Course Summary: Lower Limb Orthoses

Course Name: **Short-term Tailored Training Course (Orthotics)**

Subject: **AFO AND KAFO**

Duration: **3 Months**

5.1 Theoretical Modules:

	Device	Subject	Description
1.1	Anatomy		Introduction to: <ul style="list-style-type: none"> • Histology and cytology • Muscular skeletal system
1.2	Pathology		Introduction to: <ul style="list-style-type: none"> • Neoplasm/Metabolic disorders • Degenerative diseases • Congenital deficiencies • Spinal disorders • General element of paralysis
1.3	Biomechanics		Introduction to: <ul style="list-style-type: none"> • Basic concepts of locomotor system • Normal Human locomotion • Pathological gait • Biomechanics of Lower Limb Orthosis
1.4	Management		Introduction to: <ul style="list-style-type: none"> • Basic principles of management • Finance and marketing • Principles of purchasing and stores management
1.5	Technology		Introduction to: <ul style="list-style-type: none"> • Healthy safety • Hand and machine tools • Machines and equipments • Ferrous and non-ferrous metals • Synthetic and non-synthetic materials

5.2 Practical Modules:

2.1	Ankle Foot Orthosis	4 patients	<ul style="list-style-type: none"> • Perform patient assessment and measurement • Prescribe the appropriate device in consultation with supervisors. • Carry out casting procedure using Plaster of Paris standing or lying position. • Carry out modification procedure on positive model/ (4)using PP 5/4 mm thermoformed and use upright bended, trimming according to individual patient • Carry out fitting procedure with supervision. • Carry out finishing procedure of the device using leather and Velcro strap
2.2	Knee Ankle Foot Orthosis	4 Patients	<ul style="list-style-type: none"> • Perform patient assessment and measurement • Prescribe the appropriate device in consultation with supervisors. • Carry out casting procedure using Plaster of Paris standing or lying position. • Carry out modification procedure on positive model/ (4)using PP 5 mm thermoformed and use upright bended, trimming according to individual patient • Carry out fitting procedure with supervision. • Carry out finishing procedure of the device using leather and Velcro strap

5.3 Final Examination:

3.1	Final Examination	1 KAFO Patient	<ul style="list-style-type: none"> • Initial presentation of the patient • Description of the orthosis • Fabrication of the orthosis • Final presentation of the patient • Delivering of the orthosis
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AFO AND KAFO FROMTO...../2011					
1st Month	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045	TEA BREAK				
10.45-12.45	Biomechanics	Clinical Practice	W/Management	Clinical Practice	Clinical Practice
	Biomechanics	Clinical Practice	W/Management	Clinical Practice	Clinical Practice
12.45-13.45	LUNCH BREAK				
13.45-15.45	Technology	Clinical Practice	Pathology	Clinical Practice	Physiotherapy
	Technology	Clinical Practice	Pathology	Clinical Practice	General Cleanness
2nd Month	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Biomechanics	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Biomechanics	Clinical Practice
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Physiotherapy
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	General Cleanness
3rd Month(1St week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Biomechanics	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Biomechanics	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
12.45-13.45					
13.45-15.45	Physiotherapy	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Physiotherapy	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice

3rd Month(2nd week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Theoretical Examinations			Pat-Presentation -I	Clinical Practice
					Clinical Practice
					Clinical Practice
10.30-1045					
10.45-12.45					Clinical Practice
					Clinical Practice
12.45-13.45					
13.45-15.45					Clinical Practice
					Clinical Practice
3rd Month(3rd week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
3rd Month(4th week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II

6 Course Summary: Lower Limb Prostheses

Course Name: **Short-term Tailored Training Course (Prostheses)**

Subject: **TT AND TF**

Duration: **3 Months**

6.1 Theoretical Modules:

	Device	Subject	Description
1.1	Anatomy		Introduction to: <ul style="list-style-type: none"> • Histology and cytology • Muscular skeletal system
1.2	Pathology		Introduction to: <ul style="list-style-type: none"> • Neoplasm/Metabolic disorders • Degenerative diseases • Amputation • Congenital deficiencies
1.3	Biomechanics		Introduction to: <ul style="list-style-type: none"> • Basic concepts of locomotor system • Normal Human locomotion • Pathological gait • Biomechanics of Lower Limb Prostheses
1.4	Management		Introduction to: <ul style="list-style-type: none"> • Basic principles of management • Finance and marketing • Principles of purchasing and stores management
1.5	Technology		Introduction to: <ul style="list-style-type: none"> • Healthy safety • Hand and machine tools • Machines and equipments • Ferrous and non-ferrous metals • Synthetic and non-synthetic materials

6.2 Practical Modules:

2.1	Trans-tibia Protheses	4 patients	<ul style="list-style-type: none"> • Perform patient assessment and measurement • Prescribe the appropriate device in consultation with supervisors. • Carry out casting procedure using Plaster of Paris standing or lying position. • Carry out modification procedure on positive model/ (4)using PP 5/4 mm thermoformed, trimming according to individual patient • Carry out fitting procedure with supervision. • Carry out finishing procedure of the device using EVA or Plastic
2.2	Trans-femoral Protheses	4 Patients	<ul style="list-style-type: none"> • Perform patient assessment and measurement • Prescribe the appropriate device in consultation with supervisors. • Carry out casting procedure using Plaster of Paris standing or lying position. • Carry out modification procedure on positive model/ (4)using PP 5 mm thermoformed and use upright bended, trimming according to individual patient • Carry out fitting procedure with supervision. • Carry out finishing procedure of the device using EVA or Plastic

6.3 Final Examination:

3.1	Final Examination	<p>1 TT Patient</p> <p>1 TF Patient</p>	<ul style="list-style-type: none"> • Initial presentation of the patient • Description of the trans-tibia/femoral protheses • Fabrication of the trans-tibia/femoral protheses • Final presentation of the patient • Delivering of the trans-tibia/femoral protheses
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AFO AND KAFO FROMTO...../2011					
1st Month	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045	TEA BREAK				
10.45-12.45	Biomechanics	Clinical Practice	W/Management	Clinical Practice	Clinical Practice
	Biomechanics	Clinical Practice	W/Management	Clinical Practice	Clinical Practice
12.45-13.45	LUNCH BREAK				
13.45-15.45	Technology	Clinical Practice	Pathology	Clinical Practice	Physiotherapy
	Technology	Clinical Practice	Pathology	Clinical Practice	General Cleanness
2nd Month	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Biomechanics	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Biomechanics	Clinical Practice
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Physiotherapy
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	General Cleanness
3rd Month(1St week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Pathology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Anatomy and physiology	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Biomechanics	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice

	Biomechanics	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
12.45-13.45					
13.45-15.45	Physiotherapy	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Physiotherapy	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
3rd Month(2nd week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Theoretical Examinations			Pat-Presentation -I	Clinical Practice
					Clinical Practice
					Clinical Practice
10.30-1045					
10.45-12.45					Clinical Practice
					Clinical Practice
12.45-13.45					
13.45-15.45					Clinical Practice
				Clinical Practice	
3rd Month(3rd week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice
3rd Month(4th week)	Monday	Tuesday	Wednesday	Thursday	Friday
07.30 -10.30	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II

	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
10.30-1045					
10.45-12.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
12.45-13.45					
13.45-15.45	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II
	Clinical Practice	Clinical Practice	Clinical Practice	Clinical Practice	Patient presentation- II

7 **Final Examination:**

The final examination is conducted with a panel which includes an involvement of moderators who are either or a combination of Orthopaedic Surgeons, Physiotherapist and presents of Orthopaedic Technologists and Prosthetists/Orthotists.

8 **Course Management**

The management of the course is done by the an academic and administrative team which could be down=load in the TATCOT Website www.tatcot.ac.tz

9 **Teaching and Learning Methods:**

The following are the teaching and learning methods adopted at the centre:

- Lecture
- Discussion
- Demonstrations
- Group presentation

10 **Evaluation method**

- Multiple Choice Questions (MCQ)
- OSPE
- Class exercises,
- Group work assignments,
- End of module examination

11 **Award**

Credits are awarded to successfully passing candidates at each level with a projection of either an award of a certificate, diploma or a degree at the completion of a fully recognized programme. It is also very much dependent to the entry qualification and credits/distinctions required by the accreditation institutions.

The final award at different levels is conferred by either:

- Certificate from Ministry of Health and Social Welfare (**Certificate in Lower Limb Orthotics/Prosthetics; Spinal Orthotics or Wheelchair Technology**)
- Muhimbili University of Health and Allied Sciences University (**Diploma in Orthopaedic Technology**)
- Tumaini University (**B Sc Degree in Prosthetics and Orthotics**)

12 **Reference Materials:**

12.1 **TATCOT Reference Materials:**

- TATCOT (1991). *First year practical manual, diploma course in Orthopaedic Technology of the University of Dar Es Salaam.*
- TATCOT (1991). *Second year practical manual, diploma course in Orthopaedic Technology of the University of Dar Es Salaam.*
- TATCOT (). *First year Biomechanics Manual*
- TATCOT (). *Second year Biomechanics Manual*
- TATCOT (). *Third year Biomechanics Manual*

- TATCOT (). Manual Book 2 – Anatomy
- TATCOT (). Clinical Manual
- TATCOT (1995). Manual
- *Design and realization*
- *Materials used in engineering*
- TATCOT (). *TATCOT timber technology*. TATCOT, Moshi.
- TATCOT (1981). *TATCOT manual*. TATCOT, Moshi.
- TATCOT (1991). *Second year practical manual, diploma course in Orthopaedic*

12.2 Other Reference Literature:

- Adams, J. C. and Hamblen, D. L. (2001). *Outline of Orthopaedics. 13th ed.* Chapter 1, 14-16, chapter 9-10. Harcourt Publishers Limited, London. ++ biomech chapter?
- ICRC (2006). *Prosthetics and Orthotics Manufacturing Guidelines. Using polypropylene technology.* 3. Lower limb orthotics. Physical Rehabilitation Programme. ICRC, Geneva.
- Pritchard R. T. (), *General Workshop Process and Materials*
- Sackey J.K.N. and Amoakahene S.K. (1996). *Name of book...*
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- Gregory, L. Lamers, CH: and Schaud, W. (). *Anatomy*
- Morling, K. (1998), *Geometric and Engineering Drawing*
- Ross and Wilson (1996). *Foundation of Anatomy and Physiology. 8th ed.*
- Rowett, H. G. (). *Basic Anatomy and Physiology*
- GTZ (). *Manual II*
- Timing, R. L. and Alabi, O (1987), *Mechanical Engineering Craft Theory Vol.2.*
Longman Group (UK) Ltd

12.3 Recommended Reading Materials

- Lusardi and Nielsen (2007). *Orthotics and Prosthetics in Rehabilitation. Chapter 15-16.* Butterworth-Heinemann, Woburn.
- Prosthetic-Orthotic Publications (2002). *Lower-limb Orthotics.* New York.
- Raab, W, Kaphingst, W. and Echsteiner, R. M. (2001). *VIETCOT. Guideline for Orthotic Management of Lower Extremity Disability and Custom Orthotic Seating.* Hanoi.
- Kaphingst, W. and Raab, W. et al (2000). *VIETCOT. Guideline for Prosthetic Management of Lower Extremity Amputations. Prosthetic Information for the Rehabilitation Team.* Hanoi.
- Khurmi, R. S. and Gupta, J. K. (). *Workshop technology*