



Master of Science (Transfusion Science)

TTS Program Book for 2021/2022 Academic Session

Mixed Mode

CONTENT**PAGE**

1.	Introduction to Advanced Medical and Dental Institute (AMDI)	2
2.	Welcoming Remarks	3
3.	Organisation structure of MSc (Transfusion Science) Programme	4
4.	Academic Calendar	5
5.	Academic Programme Schedule	6
6.	Curriculum Structure (Course Registration List)	7
7.	Teaching venues	8
8.	Student facilities	8
9.	Teaching faculty	10
10.	Course/Modules Objectives	12
11.	List of Reading Materials	25
12.	Evaluation Format	27

INTRODUCTION TO AMDI

The preceding decade has witnessed numerous new developments with regards to medical knowledge, medical technology and healthcare. To avoid being left behind, it is imperative that we initiate steps so as to be more innovative in exploiting these new advances for the benefit of health patients, particularly in Malaysia and throughout the Asia Pacific. In realizing this aim, Malaysian government has taken the smart initiative in establishing the Advanced Medical and Dental Institute (AMDI) which will function to manifest these aspirations particularly for the benefits of the public in the northern part of Peninsular Malaysia as well as the whole of Malaysia.

The main mission of AMDI is to function as the prime catalyst in producing specialists and scientists in both the medical and dental fields, who are competent, holistic and contemporary in their practice and profession as well as capable of generating novel discoveries. To realize this aim, AMDI adopts a comprehensive approach embracing both clinical and pure sciences in training, service and research. It is envisioned that this 'cross fertilization' philosophical approach will foster a fertile and inventive environment that increases the probability of new discoveries in both dentistry and medicine. Hence, the AMDI infrastructure is designed to facilitate this cross-fertilization approach.

The operational structure of AMDI, encompassing both clinical services and administration, classifies functioning entity as a 'cluster' consisting of specialists from the various disciplines and specializations. The collaborative approach, involving both specialists and researchers, is in tandem with the aspirations of USM i.e. raising the standards of research and teaching activities. AMDI will place great emphasis on medical and dental studies at the postgraduate level. The postgraduate medical and dental studies program is supported by all then teaching faculties of all clusters. The selection of program to be offered also took into consideration services yet to be provided by Malaysian Health Ministry so that there will be no overlapping of program.

With regards to academic program, AMDI will focus on postgraduate program such as Master of Medicine (Specialization), Master of Science (coursework mode) and research mode program at master's and doctorate levels. AMDI will initiate efforts to offer sub-specialization medical courses such as Master Specialization and in medical sub-categories, e.g. Master of Medical Specialization (Infectious Diseases). AMDI also plans to offer new program at Master's and doctorate levels as well as new 'sandwich' program, i.e., M. Med/PhD which is envisioned as the by products the integrative pure and clinical science approach propounded by AMDI.

WELCOMING REMARKS

It is a privilege and an honour for me to extend a warm “Selamat Datang” to all candidates who have registered for the course of Master in Transfusion Science.

Globally the field of transfusion science has expanded tremendously due to the rapid development of knowledge and technology through research and development activities. In Malaysia, transfusion science has been identified as an area of specialization that needs to be built up in keeping with the rapid development needs of the nation.

The objectives of this course include producing competent scientists in the field of transfusion science with the ability to conduct credible research activities. They are thus able to work with excellence in any institution or centre that provides services in transfusion science and transfusion medicine.

I would also like to extend my gratitude to all the staff of AMDI for their strong support in the development of this programme.

Finally, I would like to take this opportunity to wish the candidates all the best in this process of updating and equipping themselves with knowledge on current issues and trends in the ever-demanding field of transfusion science.

Thank you.

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Structure of MSc (Transfusion Science) Programme

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ACADEMIC CALENDAR - ACADEMIC SESSION 2021/2022

FOR ALL SCHOOLS (EXCEPT FOR SCHOOL OF MEDICAL SCIENCES AND SCHOOL OF DENTAL SCIENCES)

Main and Engineering Campus : Registration for New Student (03 & 04 October 2021) / **Orientation Week (05 - 08 October 2021)
 Health Campus : Registration for New Student (03 October 2021) / **Orientation Week (04 - 07 October 2021)

SEM	WEEK	ACTIVITY	DATE	REMARKS	
ONE	1	Teaching & Learning (T&L - 7 Weeks)	Monday, 11.10.2021 - Sunday, 17.10.2021		
	2		Monday, 18.10.2021 - Sunday, 24.10.2021	18.10.2021, Monday - Prophet Muhammad's Birthday	
	3		Monday, 25.10.2021 - Sunday, 31.10.2021		
	4		Monday, 01.11.2021 - Sunday, 07.11.2021	03.11.2021, Wednesday - Deepavali**	
	5		Monday, 08.11.2021 - Sunday, 14.11.2021	11 & 12.11.2021, Thursday & Friday - Sultan of Kelantan's Birthday (Kelantan)	
	6		Monday, 15.11.2021 - Sunday, 21.11.2021		
	7		Monday, 22.11.2021 - Sunday, 28.11.2021		
	8	Mid Semester Break	Monday, 29.11.2021 - Sunday, 05.12.2021		
	9	Teaching & Learning (T&L - 7 Weeks)	Monday, 06.12.2021 - Sunday, 12.12.2021		
	10		Monday, 13.12.2021 - Sunday, 19.12.2021		
	11		Monday, 20.12.2021 - Sunday, 26.12.2021	25.12.2021, Saturday - Christmas	
	12		Monday, 27.12.2021 - Sunday, 02.01.2022	01.01.2022, Saturday - New Year of 2022	
	13		Monday, 03.01.2022 - Sunday, 09.01.2022		
	14		Monday, 10.01.2022 - Sunday, 16.01.2022		
	15		Monday, 17.01.2022 - Sunday, 23.01.2022	18.01.2022, Tuesday - Thaipusam**	
	16	Revision Week	Monday, 24.01.2022 - Sunday, 30.01.2022		
	17	Examination (3 Weeks)	Monday, 31.01.2022 - Sunday, 06.02.2022	01 & 02.02.2022, Tuesday & Wednesday - Chinese New Year**	
	18		Monday, 07.02.2022 - Sunday, 13.02.2022		
	19		Monday, 14.02.2022 - Sunday, 20.02.2022		
	20	Mid Semester Break / Industrial Training (4 Weeks)	Monday, 21.02.2022 - Sunday, 27.02.2022		
21	Monday, 28.02.2022 - Sunday, 06.03.2022				
22	Monday, 07.03.2022 - Sunday, 13.03.2022		28.02.2022, Monday - 18.03.2022, Friday - PPJJ Intensive Course		
23	Monday, 14.03.2022 - Sunday, 20.03.2022				
TWO	24/1	Teaching & Learning (T&L - 7 Weeks)	Monday, 21.03.2022 - Sunday, 27.03.2022		
	25/2		Monday, 28.03.2022 - Sunday, 03.04.2022	03.04.2022, Sunday - Awal Ramadan	
	26/3		Monday, 04.04.2022 - Sunday, 10.04.2022		
	27/4		Monday, 11.04.2022 - Sunday, 17.04.2022		
	28/5		Monday, 18.04.2022 - Sunday, 24.04.2022	19.04.2022, Tuesday - Nuzul Al-Quran	
	29/6		Monday, 25.04.2022 - Sunday, 01.05.2022	01 & 02.05.2022, Sunday & Monday - Labour Day	
	30/7		Monday, 02.05.2022 - Sunday, 08.05.2022	02 & 03.05.2022, Monday & Tuesday - Eid-ul fitr**	
	31/8	Mid Semester Break	Monday, 09.05.2022 - Sunday, 15.05.2022	15 & 16.05.2022, Sunday & Monday - Wesak Day	
	32/9	Teaching & Learning (T&L - 7 Weeks)	Monday, 16.05.2022 - Sunday, 22.05.2022		
	33/10		Monday, 23.05.2022 - Sunday, 29.05.2022		
	34/11		Monday, 30.05.2022 - Sunday, 05.06.2022	30 & 31.05.2022, Monday & Tuesday - Pesta Kaamatan (Sabah) 01 & 02.06.2022, Wednesday & Thursday - Hari Gawai (Sarawak)	
	35/12		Monday, 06.06.2022 - Sunday, 12.06.2022	06.06.2022, Monday - Agong's Birthday	
	36/13		Monday, 13.06.2022 - Sunday, 19.06.2022		
	37/14		Monday, 20.06.2022 - Sunday, 26.06.2022		
	38/15		Monday, 27.06.2022 - Sunday, 03.07.2022		
	39/16	Revision Week	Monday, 04.07.2022 - Sunday, 10.07.2022	07.07.2022, Thursday - Penang Heritage 09.07.2022, Saturday - Penang Governor's Day 09 & 10.07.2022, Saturday & Sunday - Eid-ul adha**	
	40/17	***Examination (2 Weeks)	Examination (3 Weeks)	Monday, 11.07.2022 - Sunday, 17.07.2022	11.07.2022, Monday - Eid-ul adha** (Kelantan)
41/18	Monday, 18.07.2022 - Sunday, 24.07.2022				
42/19	Monday, 25.07.2022 - Sunday, 31.07.2022	30.07.2022, Saturday - Awal Muharram			
*KSCP / LONG VACATION	43/20	Long Vacation / Industrial Training (10/11 Weeks)	Monday, 01.08.2022 - Sunday, 07.08.2022		
	44/21		Monday, 08.08.2022 - Sunday, 14.08.2022		
	45/22		Monday, 15.08.2022 - Sunday, 21.08.2022		
	46/23		Monday, 22.08.2022 - Sunday, 28.08.2022		
	47/24		*T&L	Monday, 29.08.2022 - Sunday, 04.09.2022	31.08.2022, Wednesday - National Day
	48/25		Monday, 05.09.2022 - Sunday, 11.09.2022		
	49/26		Examination	Monday, 12.09.2022 - Sunday, 18.09.2022	16.09.2022, Friday - Malaysia Day
	50/27		Monday, 19.09.2022 - Sunday, 25.09.2022		
	51/28		Monday, 26.09.2022 - Sunday, 02.10.2022		
	52/29		Monday, 03.10.2022 - Sunday, 09.10.2022	08.10.2022, Saturday - Prophet Muhammad's Birthday	

Programme Schedule

SEMESTER	DURATION
Semester 1	11 October 2021 – 20 March 2022
Modules taught: TMR501: Genomic and Medicine TMR504: Professional and Research Skills TTS502: The Principle of Transfusion And Transplantation Science TTS507: Research	11 October 2021 – 23 January 2022
Revision	24 – 30 January 2022
Semester Exam	31 January 2022 – 20 February 2022
Semester Break	21 February – 20 March 2022
Semester II	21 March – 31 July 2022
Modules taught: TTS 503: Transfusion in Clinical Medicine TTS 505: Transplantation in Clinical Medicine TTS 506: Management of Blood Transfusion Service TTS 507: Research Module	21 March 2022 – 3 July 2022
Revision	4 -10 July 2022
Semester Exam	11 July – 31 August 2022
Long Vacation Course (KSCP)	1 August – 9 October 2022
TTS 507: Research Submission of Dissertation Viva voce	July 2022 August 2022

Curriculum Structure / Course Registration List

SEMESTER 1		
MODULE	UNITS / TYPE	MODULE COORDINATORS
TMR 501 Genomic and Medicine	3 (Core)	A.P Datin Dr. Shahrul Bariyah Sahul Hamid
TTS 502 The Principle of Transfusion and Transplantation Science	4 (Core)	Dr Ahzad Hadi Ahmad
TMR 504 Professional and Research Skills	3 (Core)	Dr. Rafidah Zainon
TTS 507 Research <i>(need to register once only in Sem. 1)</i>	20 (Core)	Dr. Nur Arzuar Abdul Rahim
Total credit Semester 1	30	
SEMESTER 2		
MODULE	UNITS/ TYPE	MODULE COORDINATORS
TTS 503 Transfusion in Clinical Medicine	3 (Core)	Dr Suria Emilia Suhana Othman Tan
TTS 505 Transplantation in Clinical Medicine	3 (Core)	Dr. Noorfarazieda Hassan
TTS 506 Management of Blood Transfusion Services (Posting at National Blood Centre, Kuala Lumpur)	4 (Core)	Dr. Sharifah Azdiana Tuan Din
TTS 507 <i>Research (auto transfer register)</i>	-	Dr. Nur Arzuar Abdul Rahim
Total credit semester II	10	
LONG VACATION COURSE		
MODULE	UNITS/ TYPE	MODULE COORDINATORS
TTS 507 <i>Research (auto transfer register)</i>	-	Dr. Nur Arzuar Abdul Rahim
TOTAL CREDIT	40	

Important Notes:

IPS Registration Guidelines for new postgraduate students:

https://ips.usm.my/images/New_Student_20212022/REGISTRATION_GUIDELINES_CWMM_MAINCAMPUS_OCT2021.pdf

Candidature matters:

<https://ips.usm.my/index.php/current-student/candidature-matters/coursework-and-mixed-mode-programme>

TEACHING VENUES

1. AMDI Academic Block, sains@bertam, Kepala Batas.
2. Advanced Diagnostic Laboratory, AMDI Bertam.
3. Centre for Knowledge, Communication and Technology for teleconferencing
4. Multidisciplinary Laboratory (MDL), sains@bertam, Kepala Batas
5. National Blood Centre, Kuala Lumpur. (TTS 506, one-month attachment)
6. Transfusion Medicine Unit, AMDI Bertam.
7. Multimedia Room/Computer Laboratory AMDI Bertam.
8. Animal Research Complex (ARC), AMDI BErtam.
9. Blood Bank (Hospital Pulau Pinang Hospital & Hospital Sultanah Bahiyah, Alor Setar)

STUDENTS FACILITIES

As registered USM students, you are entitled to all student facilities in AMDI or USM campus:

1. AMDI Learning Space (ALS), sains@bertam and Student Area
2. Multimedia Room/Computer Laboratory
3. Library
4. Free membership of AMDI Students Association

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Course/Modules Objectives

TMR 501 MODULE: GENOMICS AND MEDICINE

TOPICS		OBJECTIVES
1.	Introduction to Molecular Biology	To give an overview of genetics and molecular biology including: <ul style="list-style-type: none"> - Structure of nucleic acids and chromosomes - Genes are made of DNA - RNA structure and types of RNA - The birth of genetics - Mendel rediscovered
2.	Genes and Biological Information	To give an overview of gene transcription and translation and the control of gene expression
3.	Gene Cloning	To give a general overview on the basic principal of genomic libraries and how to identify a gene in a genomic library (Hybridisation probing, Polymerase chain reaction and DNA sequencing)
4.	Genomics and Discovery of New Drugs	To give a general overview on genomics and the discovery of new drugs
5.	Molecular Biology of Cancer	To give a general overview of the following topics: <ul style="list-style-type: none"> - Proto-oncogenes and oncogenes - Tumour suppressor genes (Inc. p53) - DNA damage and DNA repair - Cell cycle control - Telomers, telomerase and cancer - Apoptosis
6.	Application of Genomics in the Diagnosis and Prognosis of Diseases	To cover the following topics: <ul style="list-style-type: none"> - Application of in situ hybridization and combined in situ PCR for rapid diagnosis of infectious diseases - Comparative genomic hybridization - Gene array technology and cancer
7.	Application of Genomics in the Treatment of Diseases such as Cancer, Autoimmunity, Immunodeficiency and Genetic Diseases	To give a general overview of the methods and the underlying concepts of the following topics: <ul style="list-style-type: none"> - Viral vectors as a tool for vaccine development and cancer therapy
8.	Latest Advances in Medical Genomics	To give a general overview of the methods and the underlying concepts of the latest advances in medical genomics including: <ul style="list-style-type: none"> - Molecular pathology - Pharmacogenetics

TTS 502 MODULE: PRINCIPLES OF TRANSFUSION AND TRANSPLANTATION SCIENCE

Objectives

To equip candidates from diverse backgrounds with essential core knowledge before progressing to consider the applied and clinical aspects of modern transfusion and transplantation science, to review the principles of immuno-haematology that underpin modern transfusion and transplantation science, to develop skills in the interpretation of clinical laboratory data.

Synopsis

The core unit provides the basic science for the basis of the applied and clinical aspects of transfusion and transplantation sciences which will be encountered in the other units.

The students will have a working knowledge of the theory underpinning clinical and applied aspects of transfusion and transplantation science.

It will be delivered in the form of lectures, tutorials, seminars, case presentations and practical.

TOPICS		OBJECTIVES
1.	Introduction to Transfusion (1 hr)	To understand the concept of transfusion and the scope of this discipline i) Overview of procurement, processing, testing, and use of blood and related products ii) The risk and benefit of transfusion iii) Quality system.
2.	Blood Physiology (2 hrs)	To provide the students with basic understanding of blood and its constituents (rbc, wbc, plasma), rheology of blood and other related functions (oncotic pressure, osmotic pressure). To give an overview on the mechanism of formation of red blood cells, the structure and function of red blood cells (including oxygen dissociation curve). To give an overview of platelet formation, structure, function, and its role in coagulation and haemostasis. To understand the basic immunology of platelets including platelet antigens and antibodies and its clinical applications
3.	Basic Immunology (2 hrs)	To equip students with basic immunology related to transfusion eg. cellular and humoral immunity, cytokines, complements, immune response, immune modulation, and its clinical applications such as haemolysis, febrile non-haemolytic transfusion reaction, GVHD, TRALI etc

4.	Blood Group Antigens and Antibodies (7 hrs) i) ABO and Lewis (3 hrs) ii) Rh- Blood Group System (2 hrs) iii) Other Major Blood Groups (2hrs) (Student Seminar)	To give an overview of the various types of blood group systems. The emphasis should be on ABO, Rh, Lewis and the other major blood groups. To understand blood group genetics (inheritance), its molecular structure and clinical significance.
5.	Techniques in Immunohaematology (2 hrs)	To understand the principles of various immunohematology tests, indication and clinical relevance.
6.	ABO Discrepancies (Student Seminar) (2 hrs)	To discuss the causes of various types of discrepancies and how to solve them.
7.	Preparation, Storage and Transport of Blood Components (3 hrs)	To equip students with the knowledge of various methods of preparation of blood components and special blood products, storage, transport, quality aspects and indication of use.
8.	HLA System (1 hr)	To give an overview of HLA system, its molecules, histocompatibility testing and clinical significance.
9.	Haemostasis (2 hrs)	To understand the physiology of haemostasis and the principle of the testing methods involved.
10.	Plasma Derivatives (2 hrs)	To give an overview of the various plasma derivatives, fractionation and clinical use.
11.	Apheresis – Principles and Practice (2 hrs)	To give an overview of principles and practice of apheresis (plasmapheresis, plateletpheresis and leukopheresis) including therapeutic apheresis.
12.	Transfusion Microbiology (4 hrs)	To give an overview of microbiology and pathogens related to transfusion, techniques/laboratory methods used and interpretation of laboratory results.
13.	Introduction to Quality in Transfusion (2 hrs)	To provide basic understanding of the elements of quality in relation to activities involved in blood transfusion

TMR 504 MODULE: PROFESSIONAL AND RESEARCH SKILLS

TOPICS		OBJECTIVES
1.	Introduction to Research I & II	<ul style="list-style-type: none"> - Introduction to library research - Information retrieval using e-Library system - Introduction to the use of Endnote Program - Research ethics and responsibility - Ethics of Human Research - Research Types: Epidemiology and Community Base - Ethics of Animal Research - Introduction to other types of research - Research structures of USM and Malaysia - Agencies sponsoring research in Malaysia - Research proposal - Electronic Research Proposal
2.	Introduction to Research Management Skill	<ul style="list-style-type: none"> - Management of research account - Purchasing procedures - Management of research equipment
3.	Introduction to Information Technology and Science	The role of and facility for information technology at PPKT to support research activity in USM
4.	Introduction to Multimedia Skill	<ul style="list-style-type: none"> - Production of multimedia materials - Use of multimedia in teaching - Use of multimedia in preparation of presentation and publication materials - Visit multimedia laboratory at PTPM
5.	Communication skills	<ul style="list-style-type: none"> - Public speaking skill - Art of presentation - Preparing for oral examination - Group communication skills
6.	Organisational Psychology	<ul style="list-style-type: none"> - Psychology of working in a group - Leader and subordinate relationships - Emotional intelligence - Interpersonal relationship
7.	Statistical Skill I & II	<ul style="list-style-type: none"> - Introduction to medical statistics, research methodology - Calculation of sample size - Statistical requirement in research proposal - Statistical analysis of experimental results - Use of mathematical software in statistical analysis
8.	Bioinformatics	<ul style="list-style-type: none"> - Introduction to bioinformatics - Bioinformatics research facility at USM - Use of bioinformatics tools for drug Design
9.	Creativity and Innovation Research and Society	<ul style="list-style-type: none"> - Individual and milieus in fostering research creativity - National strategies for driving the creativity agenda - Role of science and technology for innovation and sustainable growth - Role of research in the development of society
10.	Introduction to Scientific Writing	Art of Scientific Writing

TTS 503 MODULE: TRANSFUSION IN CLINICAL MEDICINE

Objectives

To equip candidates from diverse backgrounds with core knowledge in understanding the pathophysiology of various diseases that can cause anaemia, and to understand the practice, indications and complications associated with blood transfusion and blood components.

Synopsis

This module will provide the essential knowledge needed to apply the basic science learnt in a previous module to contemporary clinical and laboratory practice both for service and research.

This will be delivered in the form of lectures, tutorials, seminars, case presentations and practical sessions.

TOPICS		OBJECTIVES
1.	Pathophysiology of Anaemia (2 hrs)	To explain the pathophysiology of anaemia in general and specific to major subtypes, including the clinical presentation.
2.	Blood transfusion in Clinical Practice (2 hrs)	To give an overview of the indications and usage of blood and blood products in clinical practice
3.	Transfusion in Hypoproliferative Anaemia (2 hrs)	To provide a basic understanding of hypoproliferative anaemia in terms of pathophysiology, presentation, diagnosis and principles of management
4.	Transfusion in Paediatrics - Foetal and Neonatal Haematopoiesis - Management of Congenital Anaemia (2 hrs)	- To provide an understanding of foetal and neonatal haematopoiesis - To explain aetiology, pathophysiology, diagnosis and outlines of management of congenital anaemia
5.	Transfusion in Paediatrics: Haemolytic Disease of New-born (HDN) (Student Seminar) (2 hrs)	To provide a basic understanding of HDN in terms of pathophysiology, presentation, diagnosis and management including its prevention
6.	Transfusion in Paediatrics: From neonatal to adolescent (red blood cells, platelets, plasma, leuko-depleted products) (2 hrs)	To provide a basic understanding as to how children (neonate to adolescent) are different in terms of haematology from adults, progressing to the differences in transfusion requirements in children compared to adults

7.	Platelet Immunology and alloimmunisation (1 hr)	To recapitulate the immunology of platelets, clinical manifestation of platelet alloimmunisation and its role in transfusion
8.	Blood transfusion in AIHA (2 hrs)	To provide a basic understanding of hypoproliferative AIHA in terms of pathophysiology, presentation, diagnosis and principles of management.
9.	Peri-operative Transfusion Practice (1 hr)	To give an overview of pre-op assessment, indications and the various types of transfusion support and monitoring in the peri-operative setting
10.	Autologous Blood Transfusion (1 hr)	To give an overview of types, process, storage and indications of autologous blood transfusion
11.	Transfusion Alternatives (1 hr)	To give an overview of current knowledge of various types of transfusion product alternatives with reference to erythropoietin, growth factors, antifibrinolytics, aprotinin, colloids and crystalloids etc.
12.	Emergency Transfusion (1 hr)	To give an overview of blood banking requirement to support emergency scenarios or situations
13.	Massive Transfusion (Student Seminar) (2 hrs)	To give an overview of underlying physiology of blood loss, the management and complications of massive transfusion in various clinical setting including trauma, PPH etc.
14.	Bleeding and Thrombotic disorders (2 hrs)	To give an overview on the different bleeding and thrombotic disorders, and principle of management
15.	Adverse events in transfusion – Immunological and non-Immunological (2 hrs)	To give an overview of various types of adverse events in transfusion and the pathogenesis associated with transfusion of blood and blood components, their presentation and principles of management.
16.	Transfusion Support for Oncology Patients (2 hrs)	To understand the indications and types of transfusion support for oncology patients.
17.	Erythrocytosis and Therapeutic Phlebotomy (1 hr)	To provide a basic understanding of the aetiology, pathophysiology, presentation and management of erythrocytosis, including therapeutic phlebotomy.

18.	Blood Substitutes (1 hr)	To provide an overview of current knowledge of various types of transfusion products and alternatives (artificial blood products, modified blood groups products and etc.).
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TTS 505 MODULE: TRANSPLANTATION IN CLINICAL MEDICINE

Objectives

To educate students on the science and basis of transplantation, to instil awareness of the origins, supply and demand of organs and tissues for transplantation and the ethical and legal constraints surrounding their collection and use, to instil a critical understanding of current practice and recent advances in transfusion and transplantation.

Synopsis

This module will deal with various aspects of organ transplantation including stem cell and cord blood. In addition they should be able to interpret immunogenic tests for typing, matching and cross matching, interpret immunological responses to transplanted human tissues.

This will be delivered in the form of lectures, tutorials, seminars, practical sessions and visit to a bone marrow transplant unit.

TOPICS		OBJECTIVES
1.	HLA – from Serology to Antigen Molecules and Genes (1 hr)	To understand the structural and functional aspects of HLA molecules and to provide an understanding of some biological aspects of HLA in relation to issues of histocompatibility testing in transplantation
2.	HLA Typing in Stem Cells, Tissue and Organ Transplant (2 hrs)	To provide a basic understanding of HLA typing in stem cell, tissue and organ transplantation
3.	Flow Cytometry and Transplantation Science (1 hr)	To give an overview of principles of flow cytometry with reference to stem cell transplantation
4.	Overview of Stem Cell Transplantation (1 hr)	To provide an overview of the principles and types of stem cell transplantation, the indications, safety and risks
5.	Allogeneic Stem Cell Transplantation: General Principles, Current Practice in Malignant and Non-Malignant Disease (2 hrs)	To provide an overview about allogeneic stem cell transplantation, its general principles and current practice in the treatment of malignant and non-malignant disease including its safety and risks

6.	Allogeneic Stem Cell Transplantation: Current Problems and Solutions (1 hr)	To elaborate on issues related to current problems including causes of failure and possible solutions of allogeneic stem cell transplantation
7.	Tissue Preservation and Transplantation (2 hrs)	To give an overview of matters related to tissue preservation and transplantation, the indications and contraindications, as well as issues related to safety and risk
8.	Organ Preservation and Transplantation (2 hrs)	To give an overview of matters related to solid organ (liver, heart, lung and kidney) preservation and transplantation, the indications and contraindications, as well as issues related to safety and risk (including ABO mismatch)
9.	Autologous Stem Cells Transplant (1 hr)	To provide an overview on issues related to the use of autologous stem cells transplant, its indications and contraindications, principles, safety and risk
10.	Pharmacology and Pharmacokinetics (2 hrs)	To equip students from diverse background with essential core knowledge in basic pharmacology and basic pharmacokinetics in transplantation drugs
11.	Harvesting, Processing and Preservation of Stem Cells (1 hr)	To give an overview of the issues related to harvesting, processing and preservation of stem cells
12.	Gene Therapy in Transfusion Medicine (2 hrs)	To outline and elaborate on the development and role of gene therapy in clinical practice (potential use in transfusion medicine)
13.	Adoptive Immunotherapy (1 hr)	To outline and elaborate on the development and role of adoptive immunotherapy in transfusion medicine, the current practice and insights into the future
14.	Transfusion Support in Stem Cell And Organ Transplantation (2 hrs)	To outline and elaborate on the role and indications of transfusion support in improving the success of stem cell transplantation
15.	Organization of Organ and Tissue Procurement and Tissue Banking (2 hrs)	To give an overview of organ and tissue procurement system and tissue banking
16.	Ethical and Medico-legal Issues in Transplantation (2 hrs)	To give an overview of the ethical and consent issues in transplantation
17.	Infections in Organ and Tissue Transplantation (3 hrs)	To give an overview of the organisms involved (bacteria, virus, fungi), the pathogenesis, clinical implication and patient management

TTS 506 MODULE: MANAGEMENT OF BLOOD TRANSFUSION SERVICE

Objectives

To understand the administrative aspects, organization, social aspects, medico-legal aspects of a blood transfusion centre, to observe and take part in laboratory sessions related to blood transfusion services.

Synopsis

This module will deal with administrative and managerial aspects of a medical transfusion unit. At the end of this module, the student should be able to critically discuss ethical strategies for optimal procurement, preparation and use of blood and blood components.

This will be delivered in the form of lectures, tutorials, seminars and practical sessions.

TOPICS		OBJECTIVES	PRACTICAL IN NBC
1.	Blood Bank Management (1 hr)	To understand the organization, responsibility, personnel, equipment, reagent, inventory management	
2.	Blood Procurement (2hrs)	To acquire knowledge on blood collection, donor management, including donor criteria selection, adverse reaction and counselling	Attachment to procurement unit (3 days)
3.	Social and Public Health Issues in Blood Donation and Transfusion, Role of Media (1hr)	To understand the importance of general public in helping ensure adequacy and safety of blood supply	
4.	Management of Donated Blood (2 hrs)	To understand the various blood components and management of post donation (including testing, quarantine, release and inventory management)	Attachment to production and inventory divisions (3 days)
5.	Transfusion Transmitted Infections (2hrs)	To acquire knowledge on transfusion transmitted infections, interpretation of test results, algorithm, management of test results and discrepancies	Attachment to transfusion micro-biology lab Dry practical (2 days)

6.	Transfusion Reactions (Student Seminar) (2 hrs)	To recapitulate and discuss on various case scenarios on transfusion reactions <ul style="list-style-type: none"> - Immediate transfusion reaction - Delayed transfusion reaction - Laboratory investigation of transfusion reaction 	Student seminar (2hrs)
7.	Transfusion Process (Student Seminar) (2 hrs)	To discuss the practical aspects of blood transfusion process	Student seminar (2 hrs)
8.	Transfusion safety (2 hrs)	To understand the concept of haemovigilance and its benefit. To understand the effect of globalisation on blood safety	
9.	Risk Management in Transfusion Medicine (2 hrs)	To understand the strategies that can be taken to improve blood safety and reduce risk	
10.	Hospital-based Blood Transfusion Service (2 hrs)	To understand the clinical interface through various activities such as MSBOS, Hospital Transfusion Committee, Clinical audits etc.	Attachment to transfusion medicine lab (2 days)
11.	Immunoematology (2 hrs)	To apply the concept of immunoematology techniques	Wet and dry practicals (IPPT) Dry practical (NBC) (2 days)
12.	Quality Management System (2hrs)	<ul style="list-style-type: none"> - Standards & Guidelines - Documentation - Good Manufacturing Practice - Patient safety - National Indicators - Audits - Quality control of reagents, tests - Validation of process and equipment 	Attachment to quality division (2 days)
13.	Cord Blood (2 hrs)	To understand the concept of cord blood banking and its clinical application	Attachment to cord blood bank (1 day)
14.	Disaster Management (1 hr)	The role of blood bank in disaster management	

15.	Platelet Serology (1 day)	To understand the principle of platelet serology and its investigation	Attachment to platelet lab (1 day)
16.	Homeostasis (1 day)	To understand the concept and application of coagulation disorders in investigation of homeostatic disorders	Attachment to homeostasis lab (1 day)
17.	HLA (1 day)	To understand the principles and application of HLA phenotyping in platelet transfusion and cord-blood banking	Attachment to HLA lab (1 day)

TTS 507 MODULE: RESEARCH MODULE

The aim of this module is to develop skills in the framing of a research question, construction of a research proposal and to inculcate skills in laboratory techniques, written and oral communication and critical reasoning and analysis. Students should be able to critically discuss the significance and contribution of their project in the context of existing work. Students must demonstrate an in-depth understanding of the research process.

In the first semester students with the help of supervisors, will draft a research proposal based on the 'USM Short Term Research Grant Form' and consequently, present it before the AMDI Research & Ethics Committee. Students will begin writing up their dissertation on 'Introduction', 'Literature Review' and 'Materials & Methods' in the first semester.

In the second semester, students will conduct their research under the supervision of their respective supervisors and co-supervisors and continue with their writing.

Students will write up their dissertation based on the book 'Guide to the preparation of dissertation for master of science programme' provided by AMDI Academic office. The dissertation will be assessed by supervisors and examiners followed by a viva voce.

LIST OF READING MATERIALS

BOOKS

1. AABB, 2005. Standards for Blood Banks and Transfusion Services. 23rd ed. USA.
2. Lewis, S.M., Bain, B.J. & Bates, I., 2006. Practical Haematology. 10th ed. USA: Churchill Livingstone Elsevier.
3. Simon, T.L., Dzik, W.H., Snyder, E.L., Stowell, C.P. & Strauss, R.G., 2002. Rossi's Principles of Transfusion Medicine. 3rd ed. USA: Lippincott Williams & Wilkins.
4. Rudmann, S.V., 2005. Blood Banking and Transfusion Medicine. 2nd ed. USA: Elsevier Saunders.
5. Hoffbrand, A.V., Moss, P.A.H. & Pettit, J.E., 2006. Essential Haematology. 5th ed. USA: Wiley-Blackwell.
6. O'Shaughnessy, D., Makris, M. & Lillicrap, D., 2005. Practical Haemostasis and Thrombosis. 1st ed. USA: Blackwell Publishing, Ltd.
7. Harmening, D.M., 2005. Modern Blood Banking and Transfusion Practices. 5th ed. Philadelphia: Davis Company.
8. Green, R.E., Ford, D.S., Condon, J.A. & Lowe, V.A., 1992. Basic Blood Grouping Techniques and Procedures. 2nd ed. Australia: Victorian Immunohaematology Discussion Group.
9. Lichtman, M.A., Kipps, T.J., Kaushansky, K., Beutler, E., Seligsohn, U. & Puchal, J.T., 2006. Williams Haematology. 7th ed. USA: McGraw-Hill.
10. Daniel, G. & Bromilow, I., 2007. Essential Guide to Blood Groups. 1st ed. USA: Blackwell Publishing.
11. Hoffbrand, A.V., Catovsky, D. & Tuddenham, E.G.D., 2005. Postgraduate Haematology. 5th ed. USA: Blackwell Publishing.
12. Hoffbrand, A.V. & Pettit, J.E., 2000. Colour Atlas of Clinical Haematology. 3rd ed. USA: Mosbey.
13. Becksac, M., 2007. Bone Marrow and Stem Cell Transplantation. USA: Humana Press

Inc.

14. Soiffer, R.J., 2004. Stem Cell Transplantation for Hematologic Malignancies. USA: Humana Press Inc.

JOURNALS

1. Vox sanguinis.
2. International journal of haematology.
3. Annals of medical genetics.
4. Transfusion.
5. Blood.
6. British journal of haematology.

EVALUATION FORMAT

There are two components for the MSc programme:

1. The formal taught courses accounting for 20 credit units.
2. The research dissertation accounting for 20 credit units

SUMMARY OF ACQUIRED CREDIT UNITS	
Semester 1 – taught	10
Semester 2 - taught	10
TTS 507 Research (1 academic year)	20
Total	40

ASSESSMENT OF THE FORMAL TAUGHT COURSES

The formal taught courses will be graded and recorded as Grade Point Average (GPA) and the final GPA over the two semesters will be recorded as cumulative GPA (CGPA). The marking of the answer scripts will be based on the standard mark from 0 % to 100 % for a perfect answer. This mark will be converted to the GPA based on the following system:

MARK (%)	GRADE	GRADE POINT	RESULT
80 - 100	A	4.00	PASS
70 - 79	A-	3.67	PASS
64 - 69	B+	3.33	PASS
58 - 63	B	3.00	PASS
52 - 57	B-	2.67	PASS
46 - 51	C+	2.33	PASS
40 - 45	C	2.00	FAIL
36 - 39	C-	1.67	FAIL
32 - 35	D+	1.33	FAIL
28 - 31	D	1.00	FAIL
25 - 27	D-	0.67	FAIL
0 - 24	F	0.00	FAIL

For each module, continuous assessment will contribute 30% of the final mark while the end-of-the semester examination will contribute the other 70%.

The final grade for the module will be based on the summation of the Continuous Assessment and the end-of-semester exam.

The breakdown of the marking scheme is as follows:

A. CONTINUOUS ASSESSMENT (30%)

COMPONENTS	MARKS
Attendance/attitude	5
Log Book	5
Quiz	5
Assignment (one assignment per module of at least 1000 words)	10
Presentation/Seminar/Journal Club	5
TOTAL	30

B. END OF SEMESTER EXAMINATION (70%)

At the end of each semester, each module will have an exam paper of 3 hours long comprising:

COMPONENTS	MARKS
Multiple Choice Question (MCQ, of true/false type)	35
Essay/ Short notes	35
TOTAL	70

ASSESSMENT OF RESEARCH COMPONENT

This is a partial fulfilment for the degree of Master in Transfusion Science. The candidate has to obtain a pass in their progress reports by supervisors and the dissertation and viva voce.

REQUIREMENT FOR GRADUATION

A. REQUIREMENT I

- CGPA of at least 3.00
- GPA of not less than 2.33 for each of the formal taught modules.

B. REQUIREMENT II

A pass for the research module (**TTS 507**).

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