



NEUROSURGERY

**Residency Training Program
Leading to the degree of**

Master of Surgery (MS Neurosurgery)

**SHAHEED ZULFIQAR ALI BHUTTO MEDICAL UNIVERSITY
ISLAMABAD**

DEDICATION

Dedicated to all faculty Members of Curriculum Committee whose persistent efforts in the field of medical education will always be reminisced.



PREFACE

The Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), a public sector federal University, was established in the premises of postgraduate medical institute, Pakistan Institute of Medical Sciences, Islamabad by an ordinance of national assembly on 21 March, 2013.

Since its inception the university has made an impact in the field of healthcare, undergraduate, postgraduate medical education and research pertaining to grave health problems faced by our country. The Shaheed Zulfiqar Ali Bhutto Medical University is offering 27 post-graduation MD/MS programs. Currently the University is offering 11 Master of Surgery (MS) Programs in field of Surgery and Allied. These are four to six years' programs, classified as a Level III degree by Pakistan Medical Council and fall within Level 7 Category, as per National Qualifications Framework, Higher Education Commission of Pakistan.

In order to meet the standards of the World Federation of Medical Education a paradigm shift has ensued in the field of medical education. The standards provide a template for Institutes carrying out Post Graduate Programs. This led to developing the curriculum as per international standards of Medical Education and in congruence with the cultural, regional and demographic facets of the country.

Department of medical education of SZABMU started functioning in 2014. DME is headed by Dean and has various co-opted members including Dr. Fouzia Sultana and Dr. Zainab Abdullah who worked diligently and integrated the undergraduate curriculum in October 2021. It was also made possible by the conscientious efforts of different curriculum committees who clipped it according to the requirement of Higher Education Commission. The final draft of the curriculum is an attribute to all those who remained involved in the planning, development and evaluation of the curriculum.

Prof. Tanwir Khaliq
Vice Chancellor, SZABMU

ACKNOWLEDGEMENTS

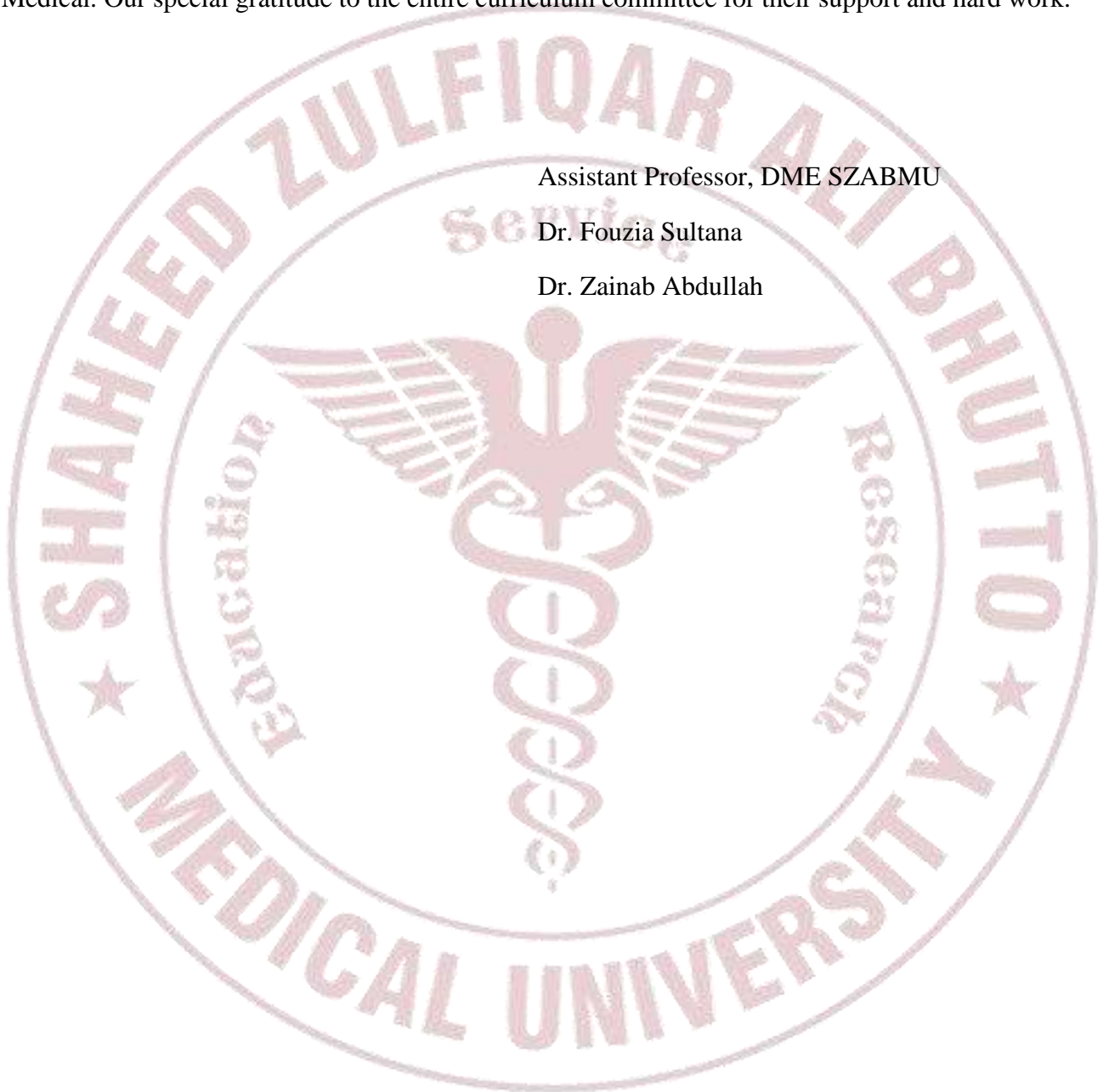
We would like to express our gratitude and appreciation to all those who gave us the opportunity to complete the curriculum.

Department of Medical Education is very grateful to the Worthy Vice Chancellor Prof. Tanwir Khaliq for his vision in initiating the revised curriculum for MS programs in Shaheed Zulfiqar Ali Bhutto Medical. Our special gratitude to the entire curriculum committee for their support and hard work.

Assistant Professor, DME SZABMU

Dr. Fouzia Sultana

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CURRICULUM

Master of Surgery (MS)

Neurosurgery

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This Curriculum is developed by the following committee:

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ROAD MAP OF MS NEUROSURGERY

(A Brief Summary)

GENERAL INFORMATION AND PROGRAM GOALS:

The Shaheed Zulfiqar Ali Bhutto Medical University is offering 21 post-graduation programs of various levels in different specialties in medicine and surgery. The University came into being in 2013 and over a course of time she has produced intelligent health care professionals with unique leadership attributes and professional proficiency. The Master of Surgery (MS) in Neurosurgery is a course aimed to attract candidates who yearn to become a competent surgeon. It is a five years' program, classified as a Level III degree by Pakistan Medical Council and falls within Level 7 Category, as per National Qualifications Framework, Higher Education Commission of Pakistan.

The Curriculum focuses on formal teaching, acquisition of knowledge, skill and competence. The student will develop into a skillful researcher so that ultimately a degree holder of MS Neurosurgery is an evidence based proficient surgeon with modified attitude and practice towards patient management. The students, upon graduation, are expected to demonstrate a high level of expertise in the field of Neurosurgery.

COURSE DESCRIPTION:

The course provides continuous medical education to the students with dedicated mentorship in clinical training. The students are taught the essentials of Surgery in general in conjunction with allied specialties both with Trauma related and non-trauma related Emergency Surgery. The students undergo academic sessions in lectures and small groups, in emergency, ward, Out Patient department and Operation rooms for minor and major procedures, in pursue of Emergency and Elective Surgical context. Management attributes may be shared by the Intensivists. Patients are evaluated in light of laboratory and imaging modalities and multidisciplinary approach is taught as the basis of patient management.

The Course can be described in the following subsequent points in time:

- MS Neurosurgery Part I Examination and Admission
- 1st and 2nd years of Clinical Training with predilection towards:
 - Principals of Surgery in General
 - Basic Surgical Skills
 - Emergency Surgery
 - Preoperative preparation
 - Intraoperative Management
 - Post Operative care and managing early and late Complications
 - Wound Care
 - The Mandatory Workshops are covered preferentially in early training.
 - The Research Question is put up, the Synopsis devised and applied for approval in the 1st year to the ERB and AS&RB.
 - Quaternary Formative Assessment of the Candidate by the supervisor is submitted

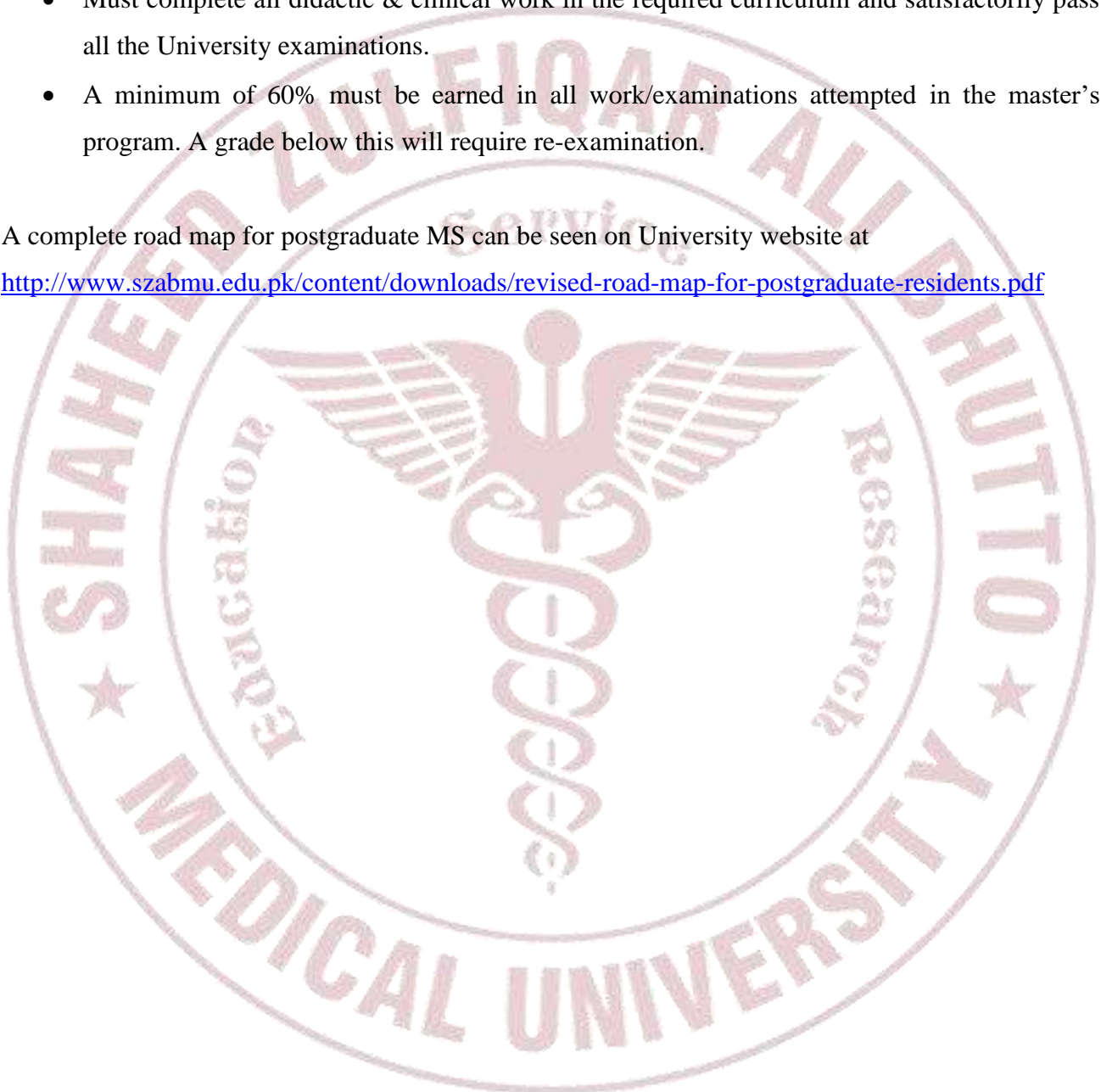
- Summative Mid Term Assessment (MTA) by the University
- 3rd year of Clinical Training with Predilection towards:
 - Specialized Surgery
 - Higher Level of Competency in Surgical Procedures
 - - Mandatory Surgical Rotations if not allotted earlier in training
 - Comencement of Research work
- 4th Year and final year of Clinical Training in MS Neurosurgery Concludes with :
 - Leadership Skills and Teamwork and teaching competency
 - Proficiency in planing patient management
 - Eliciting the recommended Surgical Competency
 - Research Writing Orientation and conclusion of Reasearch work with submission of Thesis for Approaval
- Summative Final Examination of MS Neurosurgery
 - Theory Examination (Papers A and B)
 - OSCE
 - Long Case
 - Short Cases
 - Thesis Defence

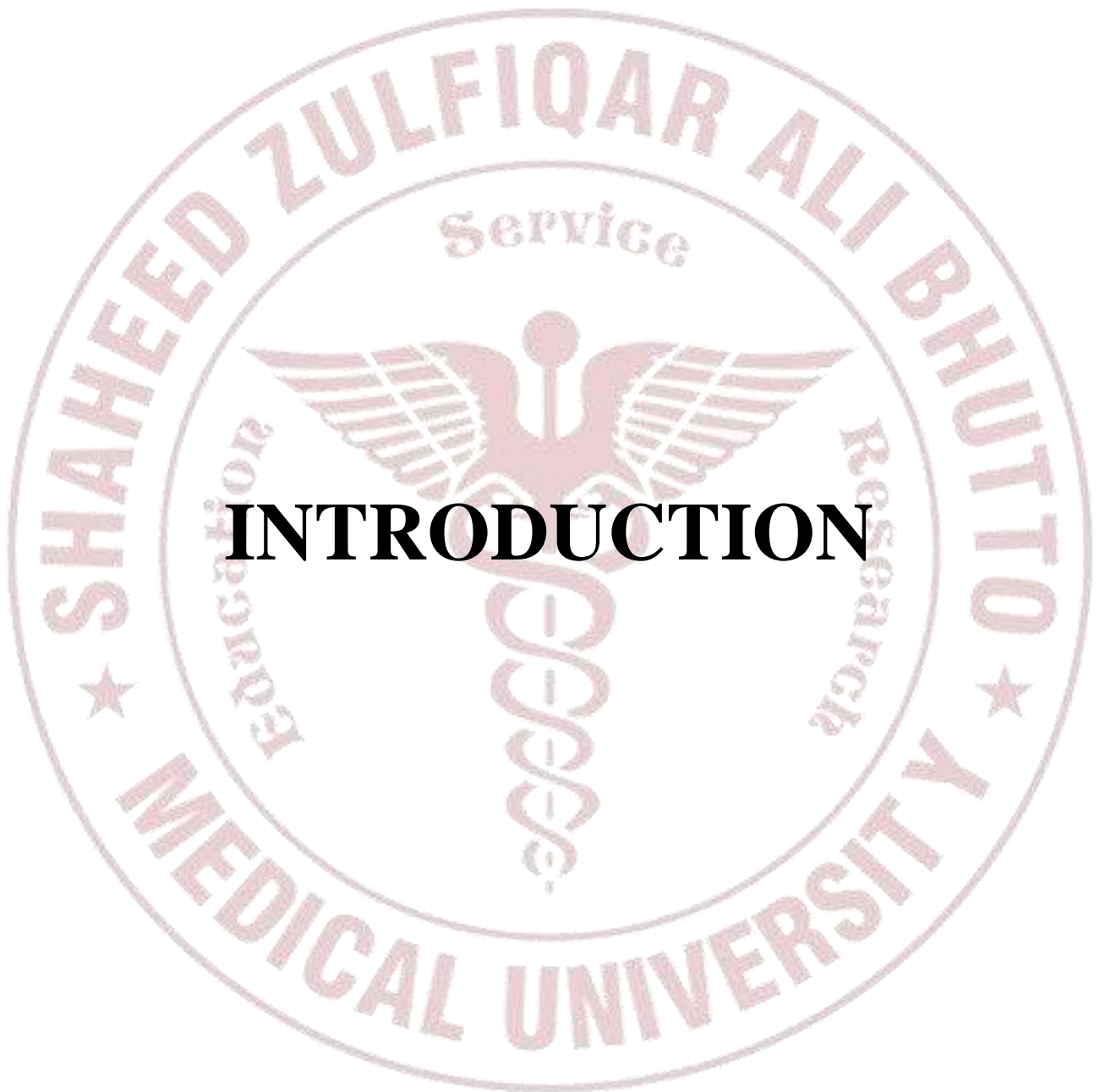
Requirements of MS Neurosurgery to Enroll Graduate Students in the Program

- Fulfillment of University requirements for postgraduate study.
- Five (5) years of consecutive full-time advanced study and clinical training.
- Complete and approved master's thesis based on original research during the course of study in an area related to specialty, suitable for publication in a reputable medical & surgery journal.
- Must complete all didactic & clinical work in the required curriculum and satisfactorily pass all the University examinations.
- A minimum of 60% must be earned in all work/examinations attempted in the master's program. A grade below this will require re-examination.

A complete road map for postgraduate MS can be seen on University website at

<http://www.szabmu.edu.pk/content/downloads/revise-road-map-for-postgraduate-residents.pdf>





INTRODUCTION

The residency program in Neurosurgery is a five year course covering all aspects of Surgery in General & Neurosurgery specially leading to the degree of Masters Surgery (MS) in Neurosurgery. This curriculum has been developed in light of the core General Surgical Knowledge and basic Surgical skills required for a Level 7 category program and is indicative of the competencies required at the varying levels of training. The requirements within the specialty are delineated together with the knowledge, skills and attitudes achieved by the trainee in acquiring those competencies. The training has been devised on the basis of:

- Greater protection of the public interest by providing clear information as to the level of training achieved.
- Improved access to specialty training than general practitioners.
- Greater flexibility of training through the availability of multiple instructors.
- Producing a competent workforce with the appropriate skills and knowledge necessary to meet the varying levels of treatment complexity, as well as considering the relative need and demand of potential patients.
- Acquire the experience to carry out research projects, critically evaluate scientific publications and communicate clinical and research papers in journals and conferences.



RATIONALE:

Need of program

This training program is structured keeping in view the need of the society. Effective provision of neurosurgical facilities to the public at large especially in remote areas is need of the hour. An institute yielding proficient surgeons, well aware of the recent statutes of health care, is duly requires as a valuable addition to the health care system.

Purpose of training

The purpose of this curriculum is to guide the training of an individual to the core level of competence required for specialist and consultant. This training will produce consultant who are specialists in their field.

Context of Training

To provide an organized educational program with guidance and supervision, a structured training program will be followed so that each trainee is exposed to different aspects of the subject and acquires special knowledge and skill as expected in this program. The training will provide a basis for the candidate to develop into a lifelong learner who is capable of self-reflection and self-directed learning. It will provide a basis for further ongoing development in the field.

Duration of training

The program leading to MS in Neurosurgery will be of 05 years full time programme.



AIMS & OBJECTIVES

AIMS & OBJECTIVES

Aims of Training

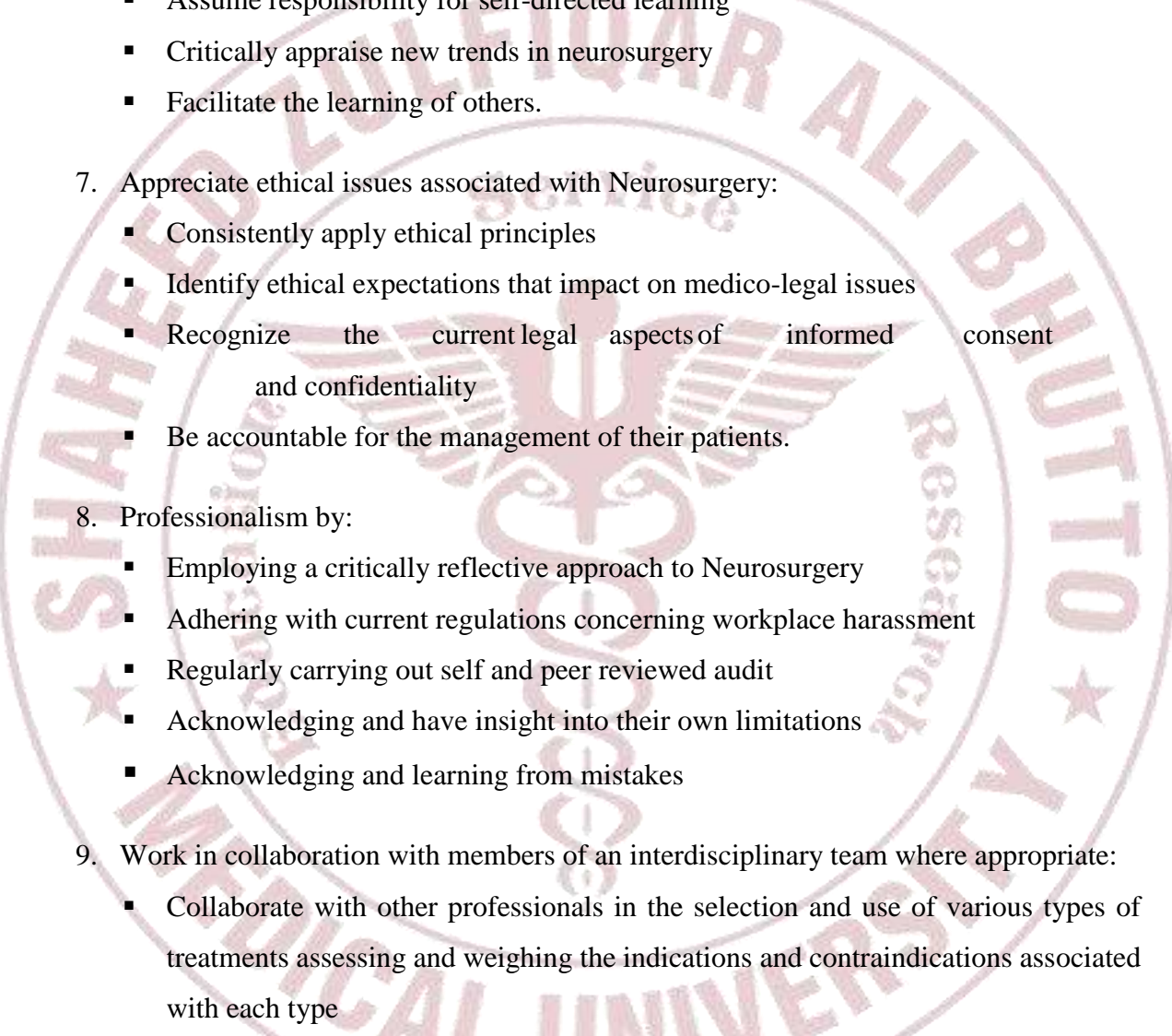
The candidate should acquire and become proficient in the skills required for Neurosurgery practice with an emphasis on Trauma and non- Trauma related Emergency Surgery, basic General Surgical Skills, Preoperative preparation, Intraoperative and post-operative care and management of complication with long term follow up. There is special concern for wound management and decision of treatment regimens and holistic management involving multidisciplinary treatment planning, and Intensive Care treatments. Due importance is paid to history taking and examination skills and appropriate use of laboratory and Imaging facilities for efficient and timely Correct diagnosis. The Competency required for a surgeon in specialty surgical procedures is primarily vested in the student. The candidate should demonstrate attitudes necessary for the achievement of high standards of surgery practice both in relation to the health needs of the population and to his/her own personal development.

Learning Objectives

MS Neurosurgery training should enable a student to:-

1. Access and apply relevant knowledge to clinical practice:
 - Maintain currency of knowledge
 - Apply scientific knowledge in practice
 - Appropriate to patient need and context
 - Critically evaluate new technology
2. Safely and effectively performs appropriate surgical procedures:
 - Consistently demonstrate sound surgical skills
 - Demonstrate procedural knowledge and technical skill at a level appropriate to the level of training
 - Demonstrate manual dexterity required to carry out procedures
 - Adapt their skills in the context of each patient and procedure
 - Maintain and acquire new skills
 - Approach and carries out procedures with due attention to safety of patient, self and others
 - Critically analyze their own clinical performance for continuous improvement
3. Design and implement effective management plans:

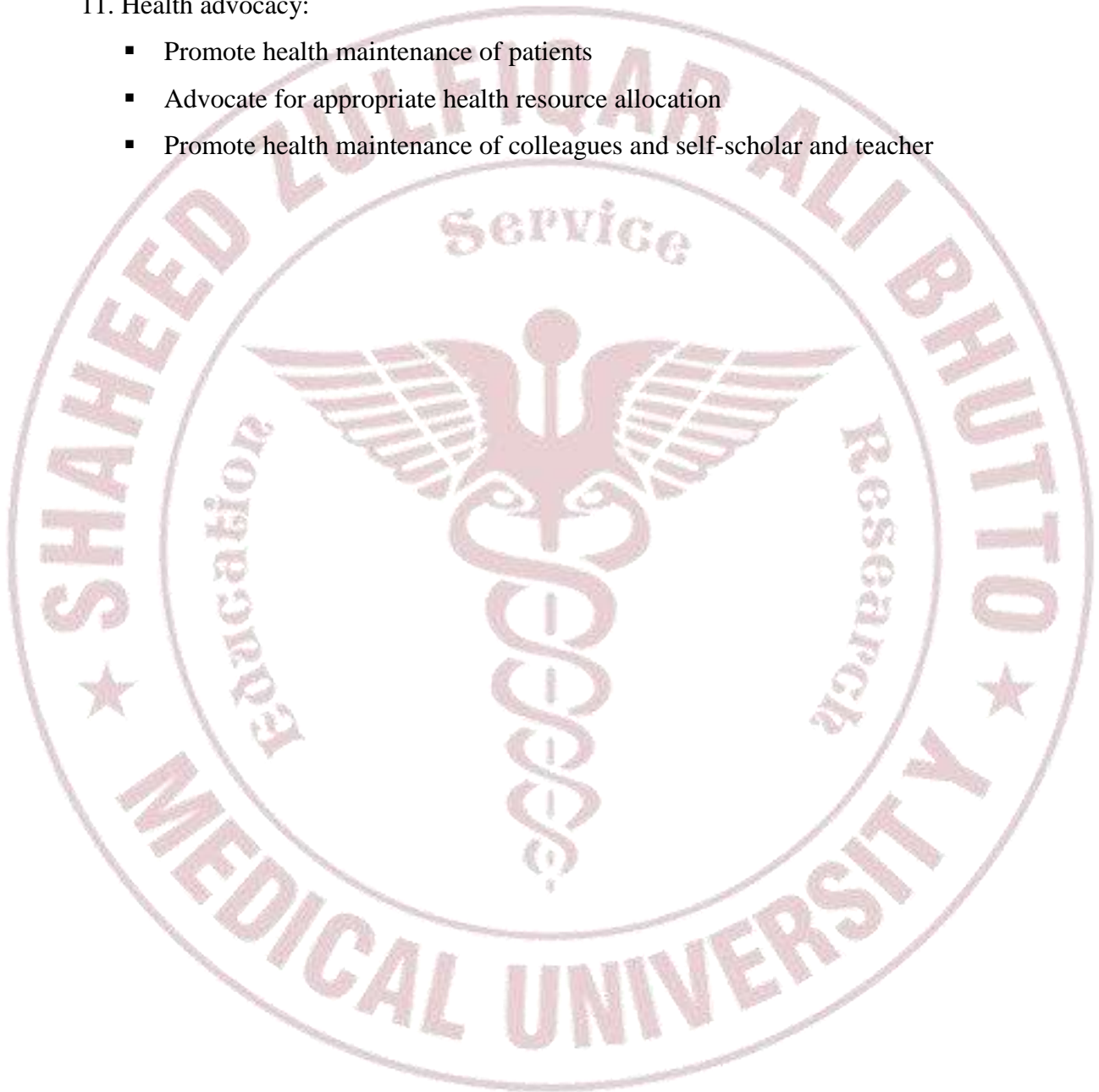
- Recognize the clinical features, accurately diagnose and manage neurological problems
 - Formulate a well-reasoned provisional diagnosis and management plan based on a thorough history and examination.
 - Formulate a differential diagnosis based on investigative findings.
 - Manage patients in ways that demonstrate sensitivity to their physical, social, cultural and psychological needs
 - Recognize disorders of the nervous system and differentiate those amenable to surgical treatment
 - Effectively manage the care of patients with neurotrauma including multiple system trauma
 - Effectively recognize and manage complications
 - Accurately identify the benefits, risks and mechanisms of action of current and evolving treatment modalities
 - Indicate alternatives in the process of interpreting investigations and in decision-making
 - Manage complexity and uncertainty
 - Consider all issues relevant to the patient
 - Identify risk
 - Assess and implement a risk management plan
 - Critically evaluate and integrate new technologies and techniques.
4. Organize diagnostic testing, imaging and consultation as needed:
- Select medically appropriate investigative tools and monitoring techniques in a cost-effective and useful manner
 - Appraise and interpret appropriate diagnostic imaging and investigations according to patients' needs
 - Critically evaluates the advantages and disadvantages of different investigative modalities
5. Communicate effectively:
- Communicate appropriate information to patients (and their family) about procedures, potentialities and risks associated with surgery in ways that encourage their participation in informed decision making
 - Communicate with the patient (and their family) the treatment options including benefits and risks of each

- 
- Communicate with and co-ordinate health management teams to achieve an optimal surgical environment
 - Initiate the resolution of misunderstandings or disputes
 - Modify communication to accommodate cultural and linguistic sensitivities of the patient
6. Recognize the value of knowledge and research and its application to clinical practice:
- Assume responsibility for self-directed learning
 - Critically appraise new trends in neurosurgery
 - Facilitate the learning of others.
7. Appreciate ethical issues associated with Neurosurgery:
- Consistently apply ethical principles
 - Identify ethical expectations that impact on medico-legal issues
 - Recognize the current legal aspects of informed consent and confidentiality
 - Be accountable for the management of their patients.
8. Professionalism by:
- Employing a critically reflective approach to Neurosurgery
 - Adhering with current regulations concerning workplace harassment
 - Regularly carrying out self and peer reviewed audit
 - Acknowledging and have insight into their own limitations
 - Acknowledging and learning from mistakes
9. Work in collaboration with members of an interdisciplinary team where appropriate:
- Collaborate with other professionals in the selection and use of various types of treatments assessing and weighing the indications and contraindications associated with each type
 - Develop a care plan for a patient in collaboration with members of an interdisciplinary team
 - Employ a consultative approach with colleagues and other professionals
 - Recognize the need to refer patients to other professionals.
10. Management and Leadership
- Effective use of resources to balance patient care and system resources
 - Identify and differentiate between system resources and patient needs

- Prioritize needs and demands dealing with limited system resources.
- Manage and lead clinical teams
- Recognize the importance of different types of expertise which contribute to the effective functioning of clinical team.
- Maintain clinically relevant and accurate contemporaneous records

11. Health advocacy:

- Promote health maintenance of patients
- Advocate for appropriate health resource allocation
- Promote health maintenance of colleagues and self-scholar and teacher





ENTRY CRITERIA

ENTRY CRITERIA

Eligibility to apply for MS Neurosurgery

- Candidate must possess MBBS or equivalent degree and one-year house job from PMC recognized Institutions.
- Permanent valid registration with PMC.
- Declared successful in MS Part-I for University programs.
- In case of foreign candidate, valid registration with Medical Council of their country of origin must be produced.

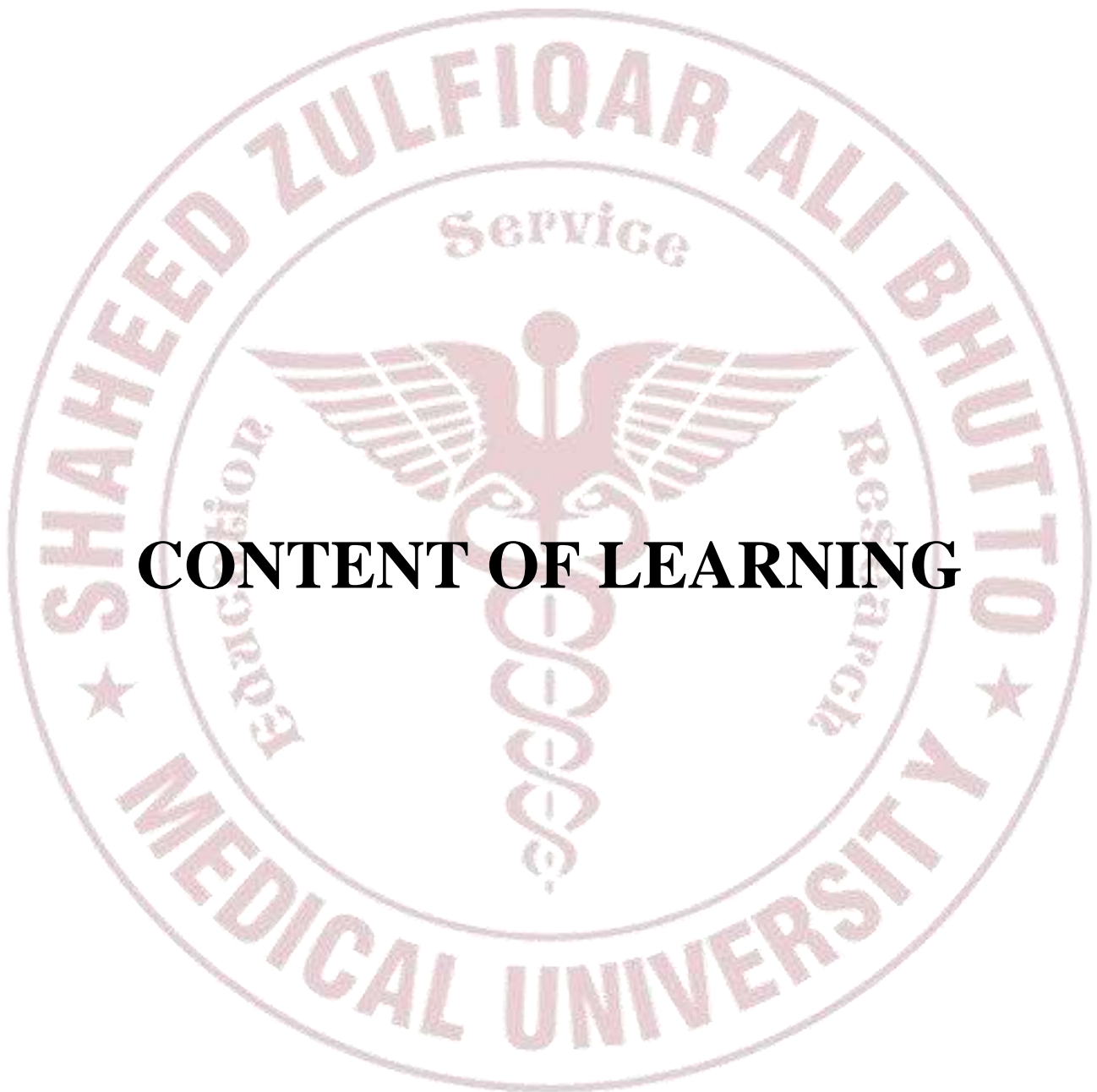
Required Documents

Attested photo copies of the following documents must be attached with the application form:

- Computerized National Identity Card (CNIC)
- Domicile certificate
- Matric/O Level, FSc/A Level, Certificates or equivalent
- MBBS degree with detail marks certificates of all professional
- MBBS Attempts certificates of all professional
- NEB pass certificate (for foreign graduates)
- House Job certificates
- PMC valid permanent registration certificate
- MS Part-I passing certificate
- Experience Certificates (if any)
- Migration Certificate (To be produced at the time of admission)

Admission Procedure

- Details of admission procedure is available on university website at <http://www.szabmu.edu.pk/admission/postgraduate-admission>



CONTENT OF LEARNING

CONTENT OF LEARNING

The program outline addresses both the knowledge needed in a neurosurgery Patient. A minimum of five years of formal training through a graded system of education as specified will equip the trainee with knowledge, skill and attitude at its completion to be able to practice basic neurosurgery surgery competently.

1. Neuroanatomy:

- To have a working knowledge of the structure and development of the central and peripheral nervous system together with the related parts of the head and spine and associated structures of neurosurgical importance.

2. Neurophysiology:

- To be familiar with the normal and abnormal physiology and metabolism of the body and central nervous system.
- To be familiar with the basic principles of neuropharmacology and
- Neurochemistry with special reference to the actions, interactions and toxic effects of drugs currently used in neurosurgery.
- To be familiar with the basic principles and interpretation of EEG, EMG and other techniques of applied neurophysiology, particularly those used intra-operatively and in neurointensive care.

3. Neuropathology:

- To be familiar with the pathological changes and cellular organization of the central and peripheral nervous system during disease process.
- To have a working knowledge of the gross and microscopic pathology of diseases affecting the nervous system.
- To recognize gross and microscopic preparations
- To be familiar with the various pathogenic organisms responsible for infections of the nervous system

4. Neuroradiology:

- To be able to recognize and comment on abnormalities present on plain X-Rays of the skull, spine and other regions of neurosurgical interest and to interpret special investigations such as myelograms, angiograms, CT and MRI scans
- To be familiar with the principles of radiobiology and radiotherapy

- To be familiar with the application of radionuclide studies to the diagnosis of neurological disorders.

5. Neurosurgery Related Clinical Competence:

- The ability to construct a differential diagnosis, interpret investigations and construct a management plan for common conditions in practice of neurosurgery in the following specialties:

i. Clinical Neurology:

- To be able to take a neurological history and to assess the value of different symptom patterns in indicating involvement of specific neurological systems and functions and/or particular disease processes
- To be able to conduct and to demonstrate a reliable clinical examination relating to the nervous system and to elicit and interpret signs of dysfunction of different systems and their components
- To be able to arrive at a well-reasoned diagnosis and to recognize the common neurological disorders and differentiate those amenable to surgical treatment
- To be conversant with all common neurosurgical disorders
- To be able to describe in detail and to discuss the choice of the appropriate conventional neurosurgical procedures available
- To be conversant with safety in the operating theatre, the use of instruments and infection control procedures
- To demonstrate competence in all aspects of the care of the patient during diagnostic tests, at operations, in the postoperative period and During rehabilitation
- To be familiar with the principles of psychiatry, neuro-psychology, neuro- ophthalmology, neuro-otology and neuro-anaesthesia
- To be able to demonstrate those attitudes that reflect awareness of, and respect for, individuality and autonomy of patients and careers at all stages of management, including counseling and providing explanations of the nature of disease and potential methods of treatment

ii. Pediatric Neurosurgery:

The resident shall be proficient in the management of developmental disorders of the neuraxis including craniofacial anomalies and spinal dysraphism; all forms of hydrocephalus; intrinsic tumours of the brain and spine and a wide range of rarer pathologies.

Paediatric neurosurgeons often contribute to the management of related disorders such as hydrocephalus, spinal dysraphism and epilepsy presenting in young adults.

iii. Neuro-oncology:

The training is based on advances in basic oncological science and the sophisticated delivery of intra-lesional therapies for the management of malignant intrinsic tumours of the nervous system with refinement of surgical techniques using radiological and functional guidance; improvements in adjuvant chemotherapy and radiotherapy; greater understanding of the molecular biology of CNS tumours and better organization of oncology services.

iv. Functional Neurosurgery:

Functional neurosurgery involves the surgical management of a wide range of neurological problems including intractable pain, epilepsy, spasticity and movement disorders. Traditional ablative surgery is being replaced by deep brain and spinal cord stimulation. Research into neuromodulation using gene

therapy, biological vectors and pharmacological agents offers the prospect of effective treatment for neurodegenerative and disabling psychiatric diseases Neurovascular Surgery:

Residents should be proficient in working closely with their interventional colleagues dealing with complex aneurysms, vascular malformations and occlusive cerebrovascular diseases.

v. Skull-base surgery:

Residents are expected to flourish in technical advances in microsurgery, surgical approaches and reconstructions in the routine practice of dealing with disorders of the skull-base including common tumors such as meningioma's,

acoustic neuromas and pituitary adenomas. Skull-base surgery is often undertaken jointly with neuro-ontological, plastic and maxillofacial surgeons. The resident should also be aware of the adjuvant treatments with sophisticated radiosurgery and fractionated stereotactic radiotherapy for patients with skull- base tumors

vi. Spinal surgery:

Spinal surgery is now the largest subspecialty in neurosurgery and accounts for more than 50% of the operative workload of some departments in European hospitals. The resident should demonstrate a comprehensive service delivery for primary and secondary spinal malignancy, spinal trauma, spinal pain and degenerative spinal disorders.

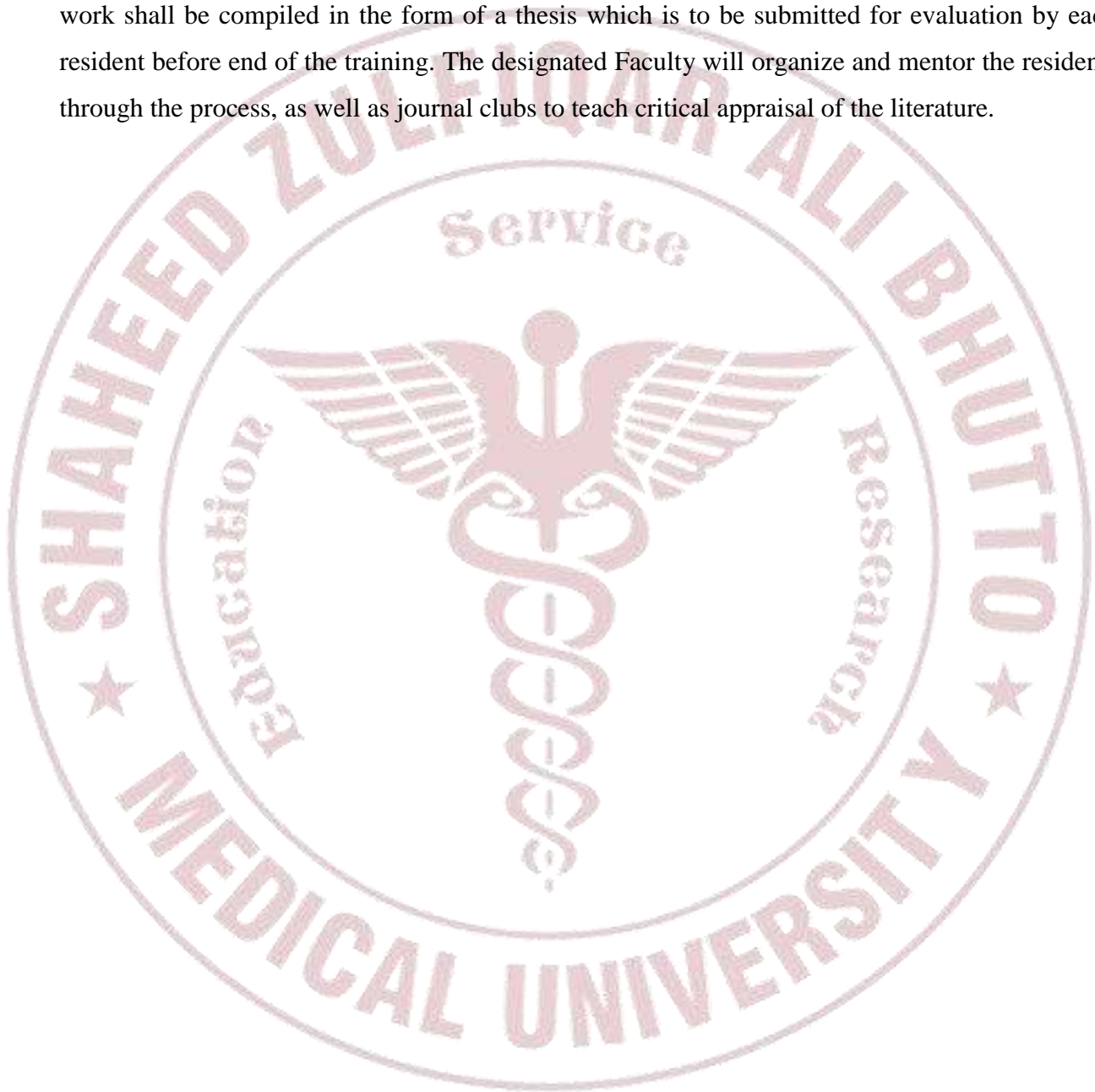
vii. Traumatology:

The resident must be able to provide a prompt neurosurgical intervention and neurointensive care and management in patients with head injury which remains a major cause of death and disability

in children and young adults.

viii. Research Experience:

All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist of original bench top laboratory research, clinical research or a combination of both. The research work shall be compiled in the form of a thesis which is to be submitted for evaluation by each resident before end of the training. The designated Faculty will organize and mentor the residents through the process, as well as journal clubs to teach critical appraisal of the literature.





COMPETENCIES

COMPETENCIES

All students are expected to reach a level of competence in different years of training after performing at least a said number of procedures at various levels of competence. Students are initially observing with the supervisor performing, later they are directly involved for assistance. Subsequently the skill acquisition level is raised with the student performing under direct supervision and later independently, when supervision is indirect.

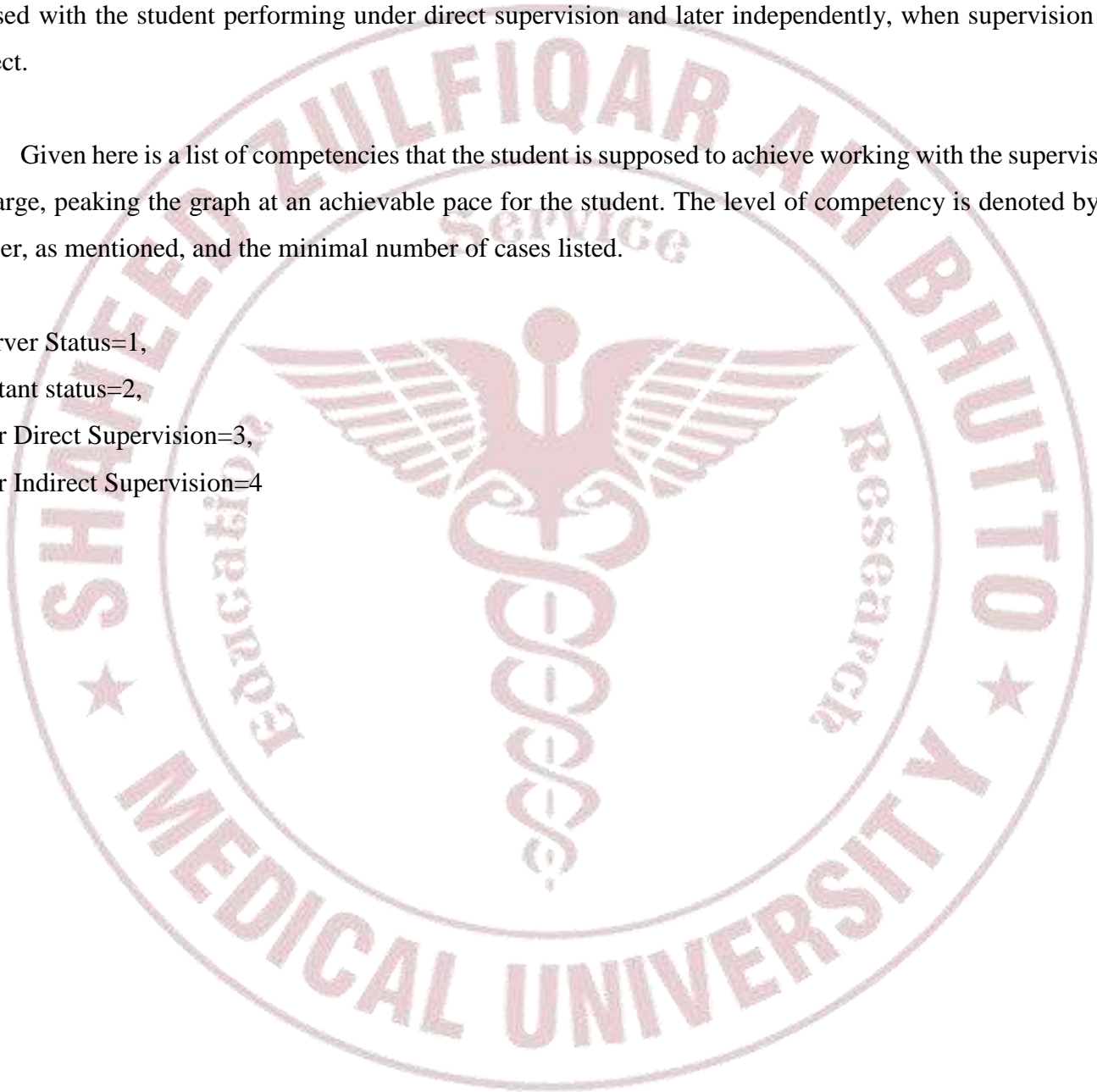
Given here is a list of competencies that the student is supposed to achieve working with the supervisor in charge, peaking the graph at an achievable pace for the student. The level of competency is denoted by a number, as mentioned, and the minimal number of cases listed.

Observer Status=1,

Assistant status=2,

Under Direct Supervision=3,

Under Indirect Supervision=4



COMPETENCY LEVELS IN PATIENT MANAGEMENT

Patient Management & Procedures	1st year	2nd year	3rd year	4th year	Final year
Taking history	2	3	4	4	4
Physical examination	2	3	4	4	4
Ordering investigations	2	3	4	4	4
Performing myelography	1	2	3	4	4
Interpreting results	2	4	4	4	4
Decision making	2	3	3	4	4
Burr holes	1	2	3	4	4
Shunts	1	2	3	4	4
Ventricular drain	1	2	3	4	4
Elevation of Depressed #	1	2	3	4	4
Spinal decompression	1	2	3	4	4
Lumber disc surgery	1	2	3	4	4
Tuberculous spine	1	2	3	4	4
Craniotomy for Extradural/subdural	1	2	3	4	4
Cervical decompression	1	2	3	4	4
Spinal tumours	1	2	2	3	4



COMPETENCY LEVELS IN PATIENT MANAGEMENT

Patient Management & Procedures	1st year	2nd year	3rd year	4th year	Final year
Gliomas	1	2	2	4	4
Brain abscess	1	2	3	4	4
Spinal fusion	1	2	3	3	3
Spinal instrumentation	1	2	3	3	3
Trigeminal rhizotomies	1	2	2	3	3
Cervical disc prolapse	1	2	2	3	3
Syringomyelia	1	2	2	3	3
Meningiomas	1	2	3	3	3
Aneurysm surgery	1	2	2	3	3
Cerebellopontine angle tumours	1	2	2	2	3
Brain stem tumour	1	2	2	2	2
Arteriovenous malformation	1	2	2	2	2
Orbital tumours	1	2	2	2	2
Skull Base tumours	1	2	2	2	3
Pituitary tumours	1	2	2	2	3
Craniopharyngioma	1	2	2	2	3
Cranioplasty	1	2	3	3	4

Log Book -Record of Clinical Cases

Longitudinal evaluation (Logbook, Assignments, Assessments)

Throughout the length of the course the performance of the candidate will be recorded on the Log Book. Completed and duly certified logbook will form a part of the application for appearing in the final examination. The Log Book will reflect the performance of the candidate in the following parameters:

- a. Entries in log book should be on regular basis, and signed by the supervisor, certifying the work.
- b. Record of competence of technical skills.
- c. Record of the assignments.
- d. Record of affective and interpersonal behaviors.
- e. Record of Journal clubs, conferences, lectures and workshops attended.

Table: Specimen from Log book

DATE	HOSPITAL No.	NAME, AGE, SEX	DIAGNOSIS	PROCEDURE PERFORMED	PERFORMANCE OF TRAINEE*	SIGNED BY IMMEDIATE SUPERVISOR

*Key 1) Observer Status 3) Performed under supervision
 2) Assistant Status 4) Performed independently

Mandatory Workshops

During training candidate will attend the following mandatory workshops arranged by the University:

I. Communication skills

The aim is acquisition of the students with an art of communication for an effective doctor patient relationship, where the art of history taking and the skill of advice and instruction communication is pivotal. This with also enhance the interpersonal communication at the hospital amongst early colleges and those in various departments of the hospital setting. Furthermore, the appearance of our students in clinical meetings, workshops, conferences and seminars will be exceptionally didactic both as participants and as presenters. Furthermore, a better skill to communicate will empower the students to present better in their assessments for the very program, especially, OSPE, long case, short case and thesis defense.

II. Research methodology, Biostatistics & Medical writing

As Research and recent advances are part and parcel of evidence-based practice, the university intends to endow in the students to raise intrigued healthcare professionals who intend to develop ease, both for the patient and the system by means of their queries and research. An elaborated session will provide a guideline as the first basic step towards thesis writing. Biostatistics will be introduced and statistics software introduction and basics workshop is carried out. Furthermore, the university provides the students with available Research and Biostatistics department as a continuum of guidance and help in their research works. Research Work is encouraged and a well-established ethical board and review committees for check of quality and virtues at all levels.

III. Computer and internet skills

Since literature review is the essence of research, an effective student must vest in him the recent updates in regards to the available search engines and gadgets, the software and platforms which lead to better understanding of topics. The aim of the workshop is to empower the students to better inquire for their research questions and to be able to avail the maximum out of the broad horizon of information available.

IV. Basic Life Support

Basic knowledge and skills for emergency situations in an unresponsive patient as per recent updates and protocols are delivered to the students, ensuring an up to the mark health care professional for the society at large. The workshops are well equipped and test the candidate both in knowledge and hands on.

V. Surgical skills

This workshop is the pivotal for the emerging surgeons and provides knowledge together with hands on practice. The students see, learn, perform and continue to implement well learnt basic practices over the course of the clinical training.

Candidate will be Certified of the above-mentioned workshops by the University.



ROTATIONS

In the five years' clinical course in the department of Neurosurgery, mandatory rotation as an elective of twelve (12) months may be selected subject to the availability of slot, discretion of the supervisor, and willingness of the PG Trainee. Rotation is carried out in the allied specialties and aids for better understanding of management strategies for ailments presenting to the subspecialties. Following rotations are offered

In first 24 months of training:

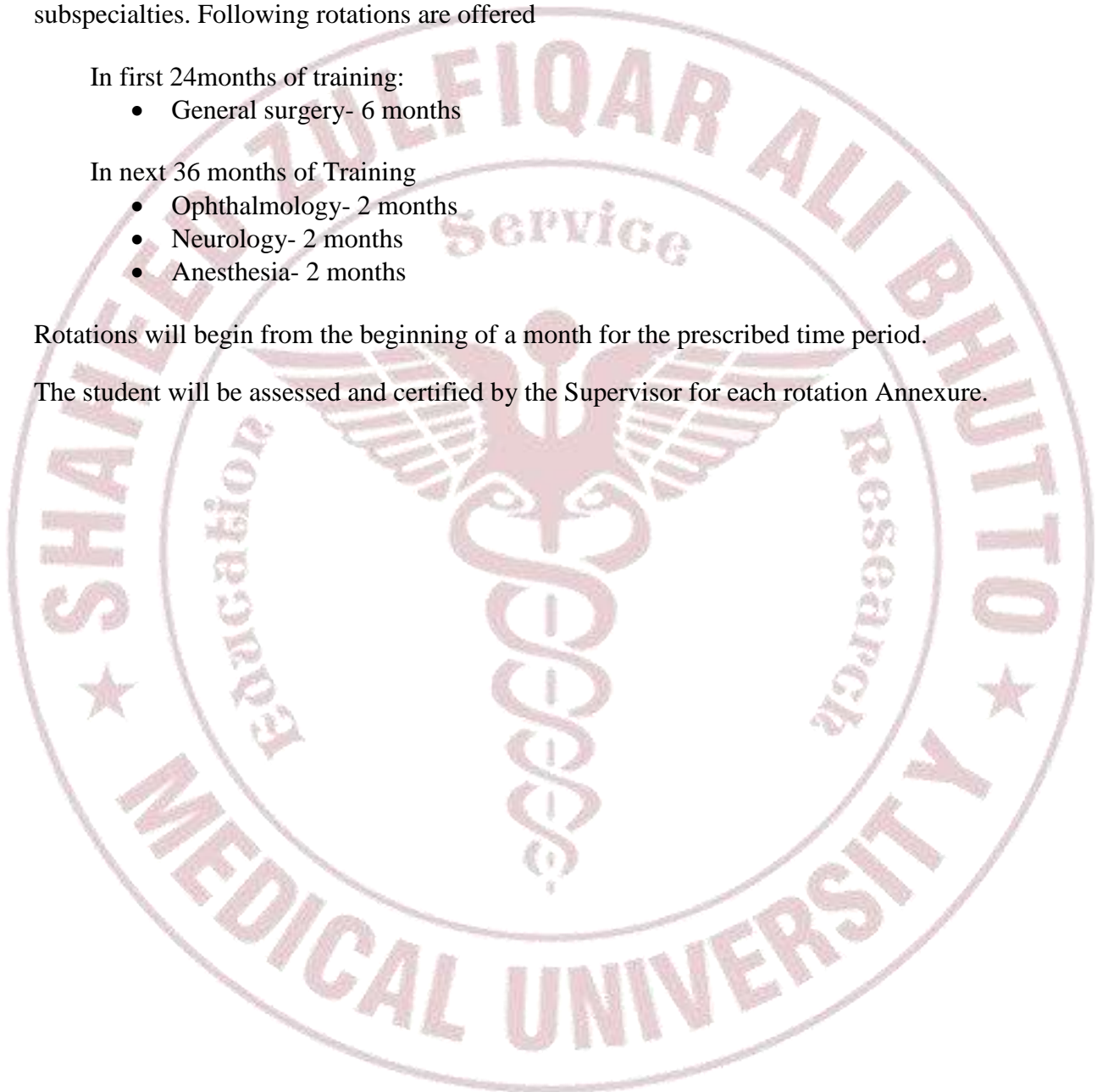
- General surgery- 6 months

In next 36 months of Training

- Ophthalmology- 2 months
- Neurology- 2 months
- Anesthesia- 2 months

Rotations will begin from the beginning of a month for the prescribed time period.

The student will be assessed and certified by the Supervisor for each rotation Annexure.



Thesis

One of the training requirements for the Degree is to undertake a research and write a Thesis on a topic related to the field of specialization. Firstly, the student shall prepare a synopsis under guidance of his supervisor. The synopsis should be in accordance with the guidelines to Synopsis written recommended by the University. Synopsis of the research must be approved from the Ethical Review Board (ERB) and the Advanced study & research board (AS&RB) before starting the research work. During process of Research the resident has to submit study data/result of project on quarterly basis to the Department of Medical Education (DME) and Biostatistician. Once the research is commenced, an elaborative document of the guided structure, the Thesis, is then submitted for approval. The thesis must be submitted for approval during the beginning of fourth year of training program. After review by three external examiners, approval of thesis from AS&RB, the Resident can appear in the final examination. The Thesis is then to be subjected to a seminar of thesis defence. A candidate shall be eligible for defence of thesis examination whether he/she shall be declared pass or fail in the theory examination. Defence of thesis examination comprising of a presentation and question/Answer session with a panel of examination. A score of 70% or above will fulfill the passing criteria.

The guideline for synopsis and thesis writing is available on University website at

<http://www.szabmu.edu.pk/content/downloads/guidelines-for-synopsis-writing.pdf>

<http://www.szabmu.edu.pk/content/downloads/guidelines-for-thesis-writing.pdf>

The thesis submitted by all post graduate residents shall comply with the instructions and guidelines for Thesis writing issued by the University. It shall form a distinct contribution to knowledge and afford evidence of originality, shown by the discovery of new facts, by the exercise of independent critical judgment and / or by the invention of new methods of investigation. It shall not include research work for which a degree has already been conferred in this or any other university/college. In the wake of fundamental improvements being introduced in the system of Higher Education in Pakistan, the credit, respect, recognition of research and scholarly publications, career development and financial gains are now linked with such original works accomplished without replicating the efforts of other researchers. Students are guided to work in light of HEC Plagiarism policy and put original effort to light.

I. Thesis Evaluation

There shall be a standing list of External Examiners for each discipline consisting of persons of eminence in the respective field of research. The list shall be suggested from time to time by the Board of Studies of the Department/ Institute, Board of Faculty concerned and approved by the Research Board. The External Examiners will be requested to critically examine the thesis for its suitability for acceptance.

The candidate shall in the first instance submit four unbound copies of his/her complete thesis along with an application on prescribed form for the evaluation of his/ her thesis, duly forwarded

by his/her supervisor and the Head of Neurosurgery Department. The Vice Chancellor shall appoint three External Examiners from the approved list of External Examiners.

The reports of the examiners shall be placed before the Research Board for consideration. If two of the three Examiners find that the thesis is wholly inadequate it may be rejected by the Research Board.

If any of the examiners suggests modification/ revision of the thesis, the candidate shall be required to resubmit a revised version of the thesis duly certified by the supervisor, within one year (in case of Major Correction). The revised version of the thesis shall be approved by the same examiners (s) who suggested modification/ revision of the thesis (in case of Major Correction).

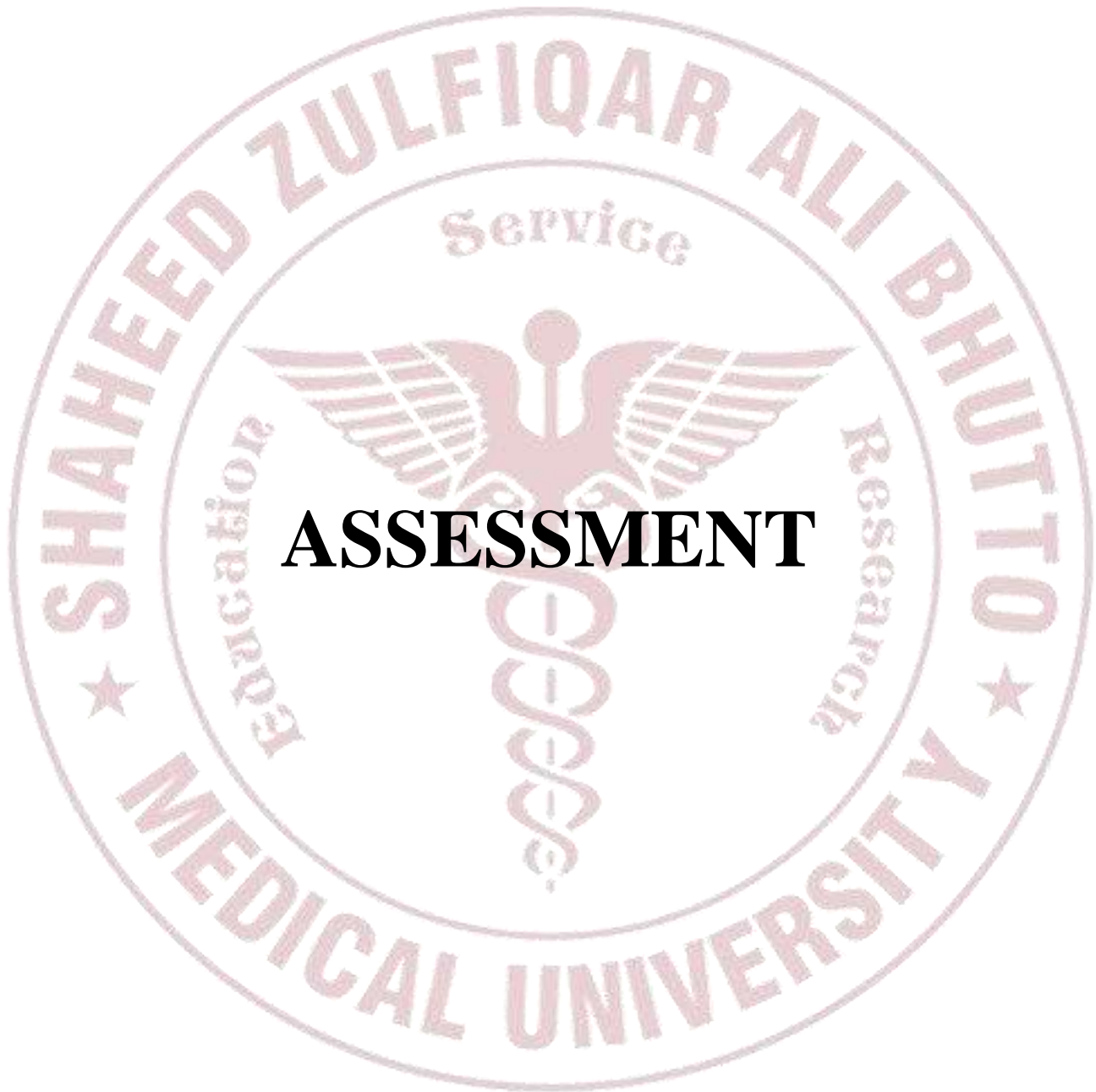
If any examiner finds the thesis adequate but suggests minor modification/ revision, this may be incorporated without referring again to the examiners. However, supervisor will recommend the correction.

The candidate will submit the research thesis in the final year of training, six months before completion of the training.

II. Thesis Evaluation Criteria for AS & RB

In pursuance of recommendations of Academic Council, decisions were taken about thesis evaluation of MS Neurosurgery thesis. Three (03) copies of thesis will be sent to three (03) external examiners for evaluation (28th February for Aug/Sep exam & 31st August for Mar/Apr Exam). In consideration of thesis evaluation reports, the Board's decision for thesis evaluation is as follows:

- If three examiners have accepted thesis with minor correction in present/accepted form thesis should be sent to the Advanced Studies & Research Boards (AS & RB) for further necessary action.
- In case two external examiners accepted thesis as minor in present/accepted form and third examiner reject the thesis, all thesis report will be rejected, and student must rewrite thesis.
- In case of two minor and one major corrections student will resubmit the thesis after three months.
- Time required for Thesis evaluation is within one year.



ASSESSMENT

ASSESSMENT

Assessment of trainees will cover the cognitive, psychomotor and affective domains. It will take two forms:

- Formative Assessment
- Summative Assessment

Formative Assessment

It is the continuous assessment of progress and competence. It will be conducted through workplace-based assessment throughout the training. Assessment will be undertaken by a range of assessors and will cover a range of procedures appropriate to the stage of training. Formative assessment will include:

- Directly observed practical skills (DOPS)
- Case based discussion (CbD)
- Mini clinical examination exercises (Mini-CEX)
- Multiple source feedback (MSF)

Residents will be evaluated by Supervisor quarterly throughout the Residency according to the syllabus/curriculum and report will be submitted to the Registrar office. A specified template form is used to submit the report (Annexure).

Summative Assessment

Summative assessment will be held twice:

1. Mid Term Assessment (MTA) Examination (At the end of 2nd year)
2. Final/Exit Examination (At the end of Final Year)

The level of performance required for passing the exam will depend on the knowledge and skills necessary for acceptable performance and will not be adjusted to regulate the number or proportion of persons passing the examination. The pass point will be determined by careful analysis and judgment of acceptable performance.

STANDARD ASSESSMENT PROTOCOLS / FORMAT OF EXAMINATIONS

Mid Term Assessment (MTA)

The Mid Term Assessment (MTA) examination is mandatory eligibility requirement for all Postgraduate Final examinations. Candidates are required to have passed MS Part-I, complete two years training in Neurosurgery, get approval of their Synopsis from AS&RB and take the MTA Examination. In case of failure in the MTA examination, the trainees are permitted to continue their training but must pass the MTA examination prior to appear in the final examination.

Format of Examination

MTA Examination consists of the following components:

ASSESSMENT		
Written	Paper:100 One Best MCQs (100 Marks) Part-A: 50% MCQs from General Principles Part-B: 50% MCQs from Specialty Oriented	Pass Marks 60% Aggregate and Not Less than 55% in any Part (A Or B)
Assessment of Clinical & Technical Skills (ACTS/OSCE)	100 Marks 8-12 Stations	Pass Marks 60%
Total Marks		200

Format of Mid Term Assessment (MTA)

1. Multiple Choice Questions (MCQs)

The MTA comprises of two parts; A and B. Each MCQ carries 2 marks. There is no negative marking. MCQs are choose the best one type. Time available is minutes for each paper with a gap of minutes in between both A and B papers.

- Paper A comprises of 50 MCQs from Surgery in General.
- Paper B comprises of 50 MCQs from Allied specialties.

2. Assessment of Clinical & Technical Skills (ACTS/OSCE)

- **Eligibility**

A candidate shall be eligible for the ACTS/OSCE after passing MTA examination. He can avail three consecutive clinical examinations after passing the exam.

A candidate availing/missed all the three consecutive chances of clinical examination after passing an MTA examination, he shall appear again in the theory examination.

- **Format**

ACTS/ OSCE will comprise of 12-18 stations of 5 to 8 minutes each with a change time of one minute for the candidate to move from one station to the other. The stations would have an examiner, a patient or both. Structured clinical tasks will be set at each station. The examiners using a global rating scale will assess the performance of each candidate. On stations where no examiner is present the candidates will have to submit written responses to short answer questions on a response sheet. There will be two types of stations: static and interactive. On

static stations the candidate will be presented with patient data, a clinical problem or a research study and will be asked to give written responses to questions asked. In the interactive stations the candidate will have to perform a procedure, for example, taking history, performing clinical examination, counseling, assembling an instrument etc. One examiner will be present at each interactive station and will either rate the performance of the candidate or ask questions testing reasoning and problem-solving skills.

Final Postgraduate Examination

Final Postgraduate examination of MS Neurosurgery is comprising of following three (03) main components:

1. Theory Examination
2. OSCE & Clinical Examination
3. Defence of Thesis

1. Theory Examination

- **Format & Passing Criteria**

Paper	Type	Marks	Duration	Passing Criteria
Paper – I	One Best Type MCQ Paper	100	03 Hours	75 % in Aggregate and Not Less than 70% in any Paper
Paper – II	One Best Type MCQ Paper	100	03 Hours	

2. OSCE & Clinical Examinations

- **Eligibility**

A candidate shall be eligible for the OSCE & Clinical Examination after passing theory examination. He can avail three consecutive clinical examinations after passing a final theory examination.

A candidate availing/missed all the three consecutive chances of clinical examination after passing a theory examination, he shall appear again in the theory examination

- **Format & Passing Criteria**

OSCE & Clinical Examination is comprising of three components

- i. OSCE
- ii. Long Case
- iii. Short Case

i. Format of OSCE

Observed Structured Clinical Examination (OSCE) will comprise of 12-18 stations of 5 to 8 minutes each with a change time of one minute for the candidate to move from one station to the other. The stations would have an examiner, a patient or both. Structured clinical tasks will be set at each station. The examiners using a global rating scale will assess the performance of each candidate. On stations where no examiner is present the candidates will have to submit written responses to short answer questions on a response sheet. There will be two types of stations: static and interactive. On static stations the candidate will be presented with patient data, a clinical problem or a research study and will be asked to give written responses to questions asked. In the interactive stations the candidate will have to perform a procedure, for example, taking history, performing clinical examination, counseling, assembling an instrument etc. One examiner will be present at each interactive station and will either rate the performance of the candidate or ask questions testing reasoning and problem-solving skills.

ii. Format of long case

For assessment of the holistic approach of the candidate regarding patient management, each candidate will be allotted one long case and allowed 30 minutes for history taking and clinical examination. Candidates should take a careful history from the patient (or relative) and after a thorough physical examination identify the problems which the patient presents with. During the period a pair of examiners will observe the candidate. In this section the candidates will be assessed on the following areas:

- **Interviewing skills**

- Introduces one self. Listens patiently and is polite with the patient.
- Is able to extract relevant information.

- **Clinical examination skills**

- Takes informed consent
- Uses correct clinical methods systematically (including appropriate exposure and re-draping).

- **Case presentation/ discussion**

- Presents skillfully
- Gives correct findings.
- Gives logical interpretations of findings and discusses differential diagnosis.
- Enumerates and justifies relevant investigations.
- Outlines and justifies treatment plan (including rehabilitation).
- Discusses prevention and prognosis.
- Has knowledge of recent advances relevant to the case.
- During case discussion the candidate may ask the examiners for laboratory investigations which shall be provided, if available. Even if they are not available and are relevant, candidates will receive credit for the suggestion.

iii. Format of short cases

Candidates will be examined in at least four short cases for a total of 40 minutes jointly by a pair of examiners. Candidates will be given a specific task to perform on patients, one case at a time. During this part of the examination, the candidate will be assessed in:

- **Clinical examination skills**

- Takes informed consent.
- Uses correct clinical methods including appropriate exposure and re-draping.
- Examines systematically.

- **Discussion**

- Gives correct findings.
- Gives logical interpretations of findings.
- Justifies diagnosis/es.
- As the time for this section is short, the answers given by the candidates should be precise, succinct and relevant to the patient under discussion.

Component	Protocol Description	Marks	Duration	Passing Criteria
OSCE	8-12 Stations 60% Interactive 40% Static	100	5 to 6 minutes per stations	60% in Aggregate and Not Less than 55% in any Paper
Long Case	One (01) Case	100	50 Minutes	
Short Case	Four (04) Case	100	40 Minutes (10 Minutes for each case)	

If a candidate securing 60% or more marks in OSCE component He/She shall be exempted from this component in the next clinical examination until & unless he reappears in the theory examination.

3. Defence of Thesis

- **Eligibility**

A candidate shall be eligible for defence of thesis examination whether he/she shall be declared pass or fail in the theory examination

- **Format of Examination**

Defence of thesis examination comprising of a presentation and question/Answer session with a panel of examination.

- **Passing criteria**

A score of 70% or above marks is required to pass.

If a candidate shall be declared pass in the Defence of thesis examination, he/she shall be exempted from this component forever. Provisional Certificate, Transcript and Degree will be awarded only after passing all the components of the final MS Neurosurgery examination.





LEARNING RESOURCES

LEARNING RESOURCES

List of Essential Readings

Books:

Latest edition of the all of the following books:

1. Handbook of neurosurgery by marks Greenberg.
2. Brain Surgery: Complication avoidance and management - Michael, L.J. Apuzzo 2 vol
3. Neurological Examination Part A - De Jong's, Lippincott
4. Principles of Neurology – Adams, MGH
5. Localization in Clinical Neurology – Brazis., Lippincott
6. Neurological Surgery – Youmans., Elsevier
7. Operative Neurosurgery techniques - Schmidek/Sweet. Elsevier
8. Micro neurosurgery - Yasargil. 4 Volume, Thieme, New York
9. Principal Of Neurosurgery Rengachary,
10. Neuropathology - Greenfield, Holdder, . Apuzzo
11. Brain Surgery: Complication avoidance and management
12. De Jong's Neurological Examination Part A
13. Brazis Localization in Clinical Neurology
14. Youmans Neurological Surgery
15. Wilkins/Rengachary Neurosurgery
16. Ramamurthi Text Book Of Neurology & Neurosurgery
17. Greenfield's Neuropathology

Journals:

1. J Neurotrauma
2. J Neurosurgery
3. J Neurosurgery Spine
4. Acta Neurochirurgica
5. Surgical Neurology
6. Pediatric Neurosurgery
7. Neurosurgical Clinics of North America
8. Neurosurgical Focus
9. Journal of Neurosurgery Pediatrics
10. Spine 30
11. Neurosurgery
12. Surgical Neurology

ANNEXURE

Supervisor Evaluation Form

SUPERVISOR'S INTERNAL ASSESMENT/EVALUATION PROFORMA FOR MS

PGR Name: _____ Session: _____ Specialty: _____

University Registration No: _____

Period: From _____ To _____

1.	Generic Competencies		
	(Please score from 1 - 100. 75% shall be the pass marks)		Component Score
		Patient Care	20
		Medical Knowledge and Research	20
	i	Practice and System Based Learning • Journal Clubs	04
		• Audit Projects	04
		• Medical Error Investigation and Root Cause Analysis	04
		• Morbidity / Mortality / Review meetings	04
		• Awareness of Health Care Facilities	04
	iv.	Communication Skills	10
		• Informed Consent	10
		• End of life decisions	
	v.	Professionalism	04
		• Punctuality and time keeping	04
		• Patient doctor relationship	04
	• Relationship with colleagues	04	
	• Awareness of ethical issues	04	
	• Honesty and integrity	04	
2.	Specialty specific competencies		
	Please score from 1 - 100. 75% shall be the pass marks		Score achieved
	Operative Skills / Procedural Skills		
3.	Multisource Feedback Evaluation (Please score from 1 - 100. 75% shall be the pass marks)		

4.	Candidates Training Portfolio (Please score from 1 - 100.75% shall be the pass marks)		
	(Please score from 1 -100. 75% shall be the pass marks)	Component Score	Score achieved
	I. Log book of operations and procedures	25	
	II. Record of participation and presentation in academic activities	25	
	III. Record of publications	25	
IV. Record of results of assessments and examinations	25		

Total marks obtained _____ Signature of Supervisor _____

Name & Stamp _____

