21 September University of Medical & Applied Sciences
Faculty: Medicine
Program: MD Program in Neurosurgery

Neurosurgery MD Program Specification

Program Specifications of MD Program in Neurosurgery

Introduction

The six-year advanced neurosurgical education and training program at the University and training hospitals of 21 September University, it is designed to prepare the candidate to function as a consultant in neurosurgery and as a leader in the field of academic neurosurgery. It is the intent of this program to actively participate in the development of those candidates as world class neurosurgeons who will share the regional as well as the international community as neurosurgical science educators, researchers, and health care professional providers. They will learn to work in teams, share in community focused researches and interests, and committed to life-long learning activities. They will also learn to offer health care services to the patients using the evidence-based medical knowledge and high-level professional and ethical standards.

Graduates will be equipped to serve as skilled healthcare providers, educators, and researchers, committed to lifelong learning and the advancement of neurosurgical science. Emphasis is placed on teamwork, community-focused research, and the application of evidence-based medical practices. The program fosters high standards of professional conduct and ethics, ensuring that graduates deliver compassionate, patient-centered care while upholding the integrity of the neurosurgical profession.

1	**Scientific name of the program:**	**Medical Doctorate (MD) in Neurosurgery**
2	**The body responsible for granting the degree:**	**21 September University of Medical and Applied Sciences**
3	**The body responsible for the program:**	**Department of Neurosurgery**
4	**Departments participating in the program:**	**All medical department**
5	**Study Language of the Program:**	**English**
6	**Starting year of the program:**	**2024/2025**
7	**Study methods in the program:**	**Full time**
8	**Program Type**	**Single**
9	**Location of Delivery:**	**University campus and Hospital**
10	**Study system:**	**Semesters**
11	**Number of years needed for completion of the program:**	**6 years**
12	**Total credit hours**	**360 Credit Points**

13	**Targeted qualification level(s) in the program**	**Medical Doctorate (MD)**
14	**The profession(s) of graduates:**	- **Specialist clinicians in Neurosurgery** - **Good Academic staff** - **Researchers**
15	**Required qualification for admission to the program:**	**MBBS degree, academic master degree**
16	**Minimum grade requirements:**	**Good**
17	**Other admission requirements:**	**None**
18	**Prepared by:**	**Associate Professor Dr. Mohamed Shamsaldin**
19	**year of the program Accreditation:**	

University Vision, Mission and Aims

University Vision

A Contemporary University with National Responsibility and Faith Identity

University Mission

Leadership of transformation headway in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.

Aims of the University

- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service.
- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work.
- Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the “brain drain” in a way that promotes and ensures the availability of thinkers, businessmen and good citizens.
- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally.
- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education,

exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.

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Postgraduate studies and scientific research Mission and Aims
Contemporary in presenting programs of postgraduate studies and scientific research locally and regionally.
▪ **Postgraduate studies and scientific research Mission**
Postgraduate Studies and Scientific Research seeks to prepare and implement a qualitative and un applied scientific programs, in order to, prepare excellent research-leaders, able to solve community problems**.**
▪ **Postgraduate studies and scientific research Aims**
1. Create qualitative and attractive programs for graduates from local and regional universities. 2. Continuous development and updating of postgraduate programs according to comprehensive quality standards . 3. Prepare distinctive researchers through continuous education programs and develop research skills. 4. Participate with similar scientific organizations in scientific research 5. Develop the infrastructure, financial and human resources for programs of postgraduate and scientific research, according to academic accreditation standards . 6. Automate the system of postgraduate and scientific research and activate electronic contents. 7. Attract the experts of academic and researchers from internal and external environment.

Faculty Vision, Mission and Aims
▪ **Faculty Vision**
A distinguished Medical Faculty capable of competing locally and regionally.
▪ **Faculty Mission**
That the Faculty of Medicine be contemporary in providing a distinguished educational level based on creativity and innovation and a true partner in facing the main national health

challenges and in treating patients with high quality based on research to solve problems that leads to integrated health care in an ethical context

▪ Aims of the Faculty

- Finding effective solutions for the university hospital, the infrastructure of the College and its annual budget.
- Addressing the gap in human resources adequately and efficiently, and developing them on a professional basis.
- Improving the quality of human medicine program in accordance to national and international academic standards.
- Strengthening governance and management systems, consolidating decentralization, and practicing transparency and accountability.
- Building the students' abilities to think, analyze and solve problems in research methods that qualify them for the labor market and achieve their practical and professional aspirations in the future.
- Contribute to supporting scientific research directed on the basis of planning related to comprehensive development goals in Yemen.
- Forming a real and effective partnership with the community, its institutions and its counterparts in a national, Arab and international context

Department Mission and Aims

▪ Department Mission

The mission of the Neurosurgery Department is to provide outstanding education, advanced clinical training, and research excellence in the field of neurosurgery. The department is committed to preparing highly skilled, ethical, and innovative neurosurgeons capable of addressing national and regional neurological health challenges. Through the integration of clinical expertise, scientific inquiry, and compassionate care, the department supports the Faculty of Medicine's vision of delivering contemporary, research-based, and ethically grounded healthcare.

▪ Department Aims

1- To graduate competent and professional neurosurgeons who demonstrate excellence in surgical skills, clinical judgment, and ethical medical practice.
2- To promote a culture of lifelong learning and scientific advancement, encouraging faculty and trainees to engage in continuous education and impactful research.
3- To uphold transparency and accountability in all educational, clinical, and research activities, ensuring trust and integrity in the department's work.
4- To foster teamwork and interdisciplinary collaboration, enhancing patient care, surgical outcomes, and the overall educational experience.

Program Mission and Aims

▪ Program Mission

The mission of the MD in Neurosurgery Program is to prepare competent, ethical, and innovative neurosurgeons through contemporary postgraduate education, advanced clinical training, and scientific research.

▪ Program Aims

The Neurosurgery Medical Doctorate Program at 21 September University aims to:

1. To prepare the candidate to function as a consultant in neurosurgery and as a leader in the field of academic neurosurgery.
2. To actively participate in the development of those candidates as world class neurosurgeons who will share the regional as well as the international community as neurosurgical science educators, researchers, and health care professional providers.
3. To work in teams, share in community focused researches and interests, and committed to life-long learning activities.
4. To offer health care services to the patients using the evidence-based medical knowledge and high-level professional and ethical standards.

▪ Graduates' attributes

Technical and Clinical Skills

1. Precision and Coordination:
   - Excellent manual dexterity and hand-eye coordination for performing precise and complex neurosurgical procedures.
2. Critical Thinking and Diagnosis:
   - Strong critical thinking and decision-making skills for accurately diagnosing and managing complex neurological cases.
3. Surgical Proficiency:
   - Advanced knowledge and expertise in performing surgical interventions for various neurological conditions.
4. Specialization in Neurosurgery:
   - Specialized skills in specific areas like pediatric neurosurgery, peripheral nerve surgery, neuro-oncology, or spine surgery.

Personal and Professional Skills

1. Composure and Calmness:

- Ability to maintain emotional stability and focus under pressure for calm and accurate decision-making.

2. Communication Skills:
   - Effective communication for interacting with patients, physicians, and healthcare teams to understand cases and plan treatment.
3. Physical and Mental Endurance:
   - High stamina for handling long hours of concentration and physical demands.
4. Time Management and Organization:
   - Efficient time management and task organization to ensure surgeries are completed on schedule.
5. Continuous Learning:
   - Commitment to ongoing education and professional development to stay updated with advancements in neurosurgery.

Program Benchmarks
Egyptian NRS
Indian NARS

Program Benchmarks:

1- Mansoura University - MD in Neurosurgery
https://medfac.mans.edu.eg/index.php/en/

2- Aswan University - MD in Neurosurgery
https://med.aswu.edu.eg/specification-of-the-postgraduate-courses/

3- Tulane University - Combined MD/PhD in Neurosurgery
https://catalog.tulane.edu/medicine/combined-degrees/md-phd/#requirementstext;
https://catalog.tulane.edu/medicine/combined-degrees/md-phd/#overviewtext;

4- The Intercollegiate Surgical Curriculum Programme - Neurosurgery (ISCP Pathway)
https://www.iscp.ac.uk/

5- Sree Chitra Tirunal Institute For Medical Sciences And Technology - MD (Neurosurgery)
https://www.sctimst.ac.in/Academic%20and%20Research/Academic/Programmes/

6- The University of The West Indies - MD in Neurosurgery
https://sta.uwi.edu/fms/

Survey of Similar Accredited Programs at National and International Universities (Benchmarks)

Data Required	Similar Accredited Programs						Current program
	1st	2nd	3rd	4th	5th	6th	
Program Name	MD in Neurosurgery	MD in Neurosurgery	Combined MD/PhD in Neurosurgery	Neurosurgery (Intercollegiate Surgical Curriculum Program Pathway)	MD (Neurosurgery)	MD in Neurosurgery	MD in Neurosurgery
Faculty/Department	Faculty of Medicine	Faculty of Medicine	School of Medicine	Royal College of Surgeons	Dept. of Neurology	Deanery of Clinical Sciences	Faculty of Medicine
University	Mansoura University	Aswan University	Tulane University	Intercollegiate Surgical Curriculum Program	SCTIMST	UWI (Jamaica/India)	21 September University
Country	Egypt	Egypt	USA	UK	India	India	Yemen
Study Type	Full-time	Full-time	Full-time	Residency-based	Full-time	Full-time	Full-time
Study Mode	On-campus + Clinicals	On-campus + Clinicals	On-campus + Research	Hospital-based	On-campus + Hospital	On-campus + Clinicals	On-campus + Hospital
Number of Semesters	5 (Min) – 7 (Max)	5 (Min) – 7 (Max)	6 (Min) – 8 (Max)	6 (Min) – 8 (Max)	5 (Min) – 7 (Max)	5 (Min) – 7 (Max)	12 Semester
Total Credits (Without Thesis)	120 ECTS	120 ECTS	180 US Credits	130 Credits	130 Credits	120 Credits	334
Core Course Credits	90	90	140	118	100	90	334
Elective Course Credits	30	30	40	32	30	30	0
Number of Core Courses	15	15	20	19	16	15	39
Number of Elective Courses	6	6	8	0	6	6	0
Bridging Courses (if any)	None	None	Research Methods (6 cr.)	N/A	None	None	None
Thesis Credits	30	30	60	Required (No fixed credits)	30	30	26
Total Credits (Courses + Thesis)	150 ECTS	150 ECTS	240 US Credits	160 Credits	160 Credits	150 Credits	360 Credit Point
Thesis Duration	1 years	1 years	3 years	1.5 years	2 years	2 years	1 year
Minimum Program Duration	2 Years Master Degree + 3 years PhD	2 Years Master Degree + 3 years PhD	8 years	7 years	7 years	7 years	6 years
Maximum Program Duration	7 years	7 years	10 years	9 years	9 years	9 years	8 years

Intended Learning Outcomes (ILOs)	
Knowledge and Understanding (A)	
By the end of the program the candidate should be able to:	
A1	Describe the principles of general surgery and discuss the anatomy of structures other than the nervous system.
A2	Describe the precise anatomy of the central and peripheral nervous systems including the spine and skull as well as their embryology.
A3	Describe the different topics of neurology with particular emphasis on those neurological entities that have important differential diagnostic considerations with respect to neurosurgical interests.
A4	Interpret clinical electrophysiology (electroencephalography (EEG), electromyography (EMG), electrocorticography (ECoG), evoked potentials, and neuro- otology), cerebral vascular physiology including cerebral blood flow, and functional cortical localization as derived from neurophysiological and neuropsychological principles.
A5	Interpret neuroradiological examinations (plain X-rays, different computed tomographic (CT) modalities, magnetic resonance imaging (MRI) modalities, angiography, ultrasonography and radio nuclide imaging.
A6	Describe the fundamentals of clinical endocrinology.
A7	Interpret the results of neuro-ophthalmology and neuro-otology tools including perimetry, electronystagmography, and audiometry.
A8	Recognize the physiology and fundamentals of neuro-anesthesia.
A9	Describe the gross and microscopic neuropathology with recognition of morphological features allowing the formulation of a differential diagnosis with respect to the common neurological and neurosurgical disorders.
A10	Describe and discuss the following clinical competencies: 10.1 Clinical features, including the presenting signs and symptoms, natural history, and prognosis for different neurosurgical disorders. 10.2 The embryological development of the nervous system and how congenital anomalies arise. 10.3 The anatomical and physiological basis of consciousness, wakefulness and sleep. 10.4 The anatomical and physiological basis of speech, memory, learning and behavior. 10.5 The anatomical and physiological basis of the following systems: special senses, sensory, motor, autonomic, limbic, and reticular activating systems. 10.6 The physiology of the following major subdivisions of the central nervous system: major cortical regions, basal ganglia, thalamus, cerebellar, reticular activating system, respiratory centers and limbic system. 10.7 The role of medical treatment in the therapy of neurosurgical disorders including mechanism(s) of action, indications, contraindications for its use and their teratogenic effects. 10.8 The basic principles of clinical genetics. 10.9 The basic principles of clinical epidemiology. 10.10 The therapeutic and toxic effects of irradiation on neural tissues, including radiosurgery and its role in the treatment of neurosurgical disorders. 10.11 The infectious diseases of the nervous system. 10.12 The role of rehabilitative medicine in the management of neurosurgical disorders.

Intellectual Skills (B)	
By the end of the program the candidate should be able to:	
B1	Take a detailed history and carryout a detailed clinical and neurological examination in order to provide a comprehensive differential diagnosis.
B2	Order and assess appropriate diagnostic tests relating to the management of neurosurgical patients.
B3	Arrange ongoing, high quality preoperative and postoperative care, including neuro-intensive care.
B4	Design and perform different elective and emergent craniotomies (supratentorial and posterior fossa) and the subsequent: **B4.1** Removal of intratracheal hematoma **B4.2** Repair of cerebral aneurysms **B4.3** Removal of arteriovenous malformation; **B4.4** Removal of different benign and malignant intracranial tumors.
B5	Design and perform trans-sphenoidal removal of pituitary tumors.
B6	Utilize neuronavigational technology.
B7	Design and perform neck dissection appropriate to: **B7.1** Exposure of carotid arteries and endarterectomy **B7.2** Tracheostomy; **B7.3** Anterior cervical discectomy, corpectomy and fusion.
B8	Manage cervical, thoracic and lumbar spondylotic pathologies, including the relevant anterior and posterior approaches.
B9	Spinal stabilization.
B10	Manage spinal injuries and other spinal disorders.
B11	Manage cases of spinal tumors, infections, and vascular lesions.
B12	Manage the following cases of cranial and peripheral nerves: **B12.1** Trigeminal neuralgia and other cranial nerve disorders. **B12.2** Different cases of entrapment neuropathies; **B12.3** Repairing and suturing of a lacerated nerve.
B13	Manage general pediatric neurosurgical conditions including **B13.1** Craniosynostosis. **B13.2** Hydrocephalus by different shunts. **B13.3** Different cases of spinal dysraphism.
B14	Utilize endoscopy for intracranial interventions: 3rd ventriculostomy, tumor biopsy or excision, and endoscopy assisted micro neurosurgery.
B15	Manage different cases of functional neurosurgery: according to the facilities provided **B15.1** Spasticity. **B15.2** Variable pain management procedures. **B15.3** Intractable epilepsy. **B15.4** Stereotaxic surgery for movement disorders.
B16	Utilize radiosurgery.

Professional and Practical Skills (C)	
By the end of the program the candidate should be able to:	
C1	Integrate and adopt the discipline of obtaining and completing a detailed history and carrying out a detailed general and neurological examination in order to provide a comprehensive differential diagnosis and anatomical localization of diseases affecting the nervous system.
C2	Integrate the skills in ordering and interpreting appropriate general diagnostic tests (laboratory, radiological, electrophysiological, etc.) for the ideal management of patients.
C3	Design an ongoing, high quality preoperative and postoperative neurological assessment and care’
C4	Utilize the information technology to optimize patient care, learning process, and research activities.

General Skills (D)	
By the end of the training program the candidate should be able to:	
D1	Discuss appropriate information with patient/families and health care team.
D2	Adopt written documentation regarding patient consultations in a timely and accurate fashion.
D3	Integrate effectively with other interdisciplinary team activities.
D4	Acquire administrative skills to the medical team.
D5	Adopt and develop a personal continuing education strategy.
D6	Exemplify highest quality care.
D7	Exhibit appropriate personal and interpersonal professional behavior.
D8	Acquire a sufficient awareness of the scientific methods needed for criticallyanalyze the literature.
D9	Demonstrate the ability of teaching students, medical colleagues, both junior and senior as well as other health care professionals.
D10	Integrate the contribution to the discovery and development of new knowledge.

Program Structure:

Total credit points	360 Credit Points
Rules of counting credit points	**1.** They are counted according the number of study hours needed to reach the ILOs when the candidate can account 1500 – 1800 working study hours annually; every 25 – 30 hours are translated into one credit point (50 – 60 credit points annually). **2.** Study hours are counted according to the time spent during the candidates stay in the hospital doing his duties, attending lectures, seminars, conferences.
Methods of counting credit points	**1.** During daily working hours (6 hours daily) and (24 hours) for each overnight duty. **2.** Attending seminars, M.D. thesis or research discussions, journal clubs,

	and scientific meetings (6 hours). **3.** Attending conferences and workshops of outdoor activities (12hrs./day). **4.** Attending abroad conferences (18 hrs./day). **5.** All of the scientific activities and duties of the candidate are recorded in his/her own logbook under his supervisor follow up.
Distribution of the 360 credit points for the M.D. degree in neurosurgery	**1. Part one:** **A. Stage One: 30 – 60 credit points distributed as follows:** • 19 – 42 credit points for non-neurosurgical basic training (18 – 39 credit points) and other scientific activities (1 – 3 credit points). • 3 credit points for medical statistics, research methodology, medical and research ethics. • 5 – 10 credit points for specific studies (Medical, neurology and endocrinology). • 3 – 5 credit points for general clinical studies (E.N.T., Ophthalmology and Radiology). **B. Stage Two: 50 – 70 credit points distributed as follows:** • 40 – 55 credit points for basic clinical training (39 – 47 credit points) and scientific activities (1 – 3 credit points). • 10 – 15 credit points for neurosurgical studies (Anatomy, Physiology, Pharmacology). **2. Part Two: 180 – 240 credit points:** • 40 credit points for M.D. thesis with one research published in a referral international journal or two researches published in a regional or local journal. • 115 – 175 credit points for the advanced clinical training in neurosurgery, (111 – 170 credit points) and scientific activities (4 – 5 credit points). • 25 credit points for subspeciality studies in neurosurgery. • 3 credit points for optional scientific programs study.

Study Plan

Course Title	Code/No.	Theoretical Credit Points	Clinical Credit Points	Operative Credit Points	Total Credit Points	Pre-Requisites
PART I – Stage 1 & Stage 2 (Years 1–2)						
PART I – STAGE 1 (Year 1)						
Semester 1						
General Surgery (Head & Neck focus)	NSG101	8	10	7	**25**	Admission reqs
General Medicine (Neurology & Endocrinology)	MED102	6	4	–	**12**	Admission reqs
ENT, Ophthalmology & Radiology Rotations	ENR103	4	6	–	**10**	Admission reqs
Subtotal Semester 1 Credit Points		**18**	**20**	**7**	**47**	
Semester 2						
Medical Statistics	MSC104	3	–	–	**3**	–
Research Methodology	MSC105	3	–	–	**3**	–
Medical & Research Ethics	MSC106	2	–	–	**2**	–
Scientific Activities I (Seminars / Journal Clubs / Workshops)	SCI107	–	3	–	**3**	–
Integration Course (Clinical Correlations)	INT108	2	–	–	**2**	All above
Subtotal Semester 2 Credit Points		**10**	**3**	**–**	**13**	
Stage 1 Total Credit Points		**28**	**23**	**7**	**60**	
PART I – STAGE 2 (Year 2)						
Semester 3						
Anatomy of CNS & PNS (+ Embryology)	ANA201	6	6	–	**15**	Stage 1 complete
Neuropathology (Gross & Microscopic)	PAT202	4	4	–	**10**	Stage 1 complete
Neurophysiology	PHY203	3	3	–	**7**	Stage 1 complete
Critical Care & Anesthesiology	CCM204	3	5	–	**10**	Stage 1 complete
Pharmacology for Neurosurgery	PHA205	2	4	–	**8**	Stage 1 complete
Subtotal Semester 3 Credit Points		**18**	**22**	**–**	**50**	
Semester 4						
Basic Clinical Neurosurgery (ER / Ward / OPD)	NSC206	3	8	4	**15**	All Stage 2 courses
Research Proposal & Thesis Planning	RES207	3	2	–	**6**	MSC104–106
Scientific Activities II (Seminars / Proposal Presentation)	SCI208	–	3	–	**4**	–
Subtotal Semester 4 Credit Points		**6**	**13**	**4**	**30**	
Stage 2 Total Credit Points		**24**	**35**	**4**	**80**	
Part 1 Total Credit Points (Stage 1 + Stage 2)		**52**	**58**	**11**	**140**	

Course Title	Code/No.	Theoretical Credit Points	Clinical Credit Points	Operative Credit Points	Total Credit Points	Pre-Requisites
PART II – Advanced Neurosurgery (Years 3–6)						
Semester 5 (Year 3)						
Advanced Clinical Neurosurgery I (Cranial, Spinal, Emergency)	NSC301	5	10	5	**20**	Part I completed
Departmental Seminars & Workshops I	SCI302	2	3	–	**5**	Part I
Journal Club I	SCI303	2	3	–	**5**	Part I
Semester 5 Total Credit Points		**9**	**16**	**5**	**30**	
Semester 6 (Year 3)						
Advanced Clinical Neurosurgery II (Vascular, Tumor, Trauma)	NSC304	4	12	4	**20**	NSC301
Critical Care Rotation (Neuro ICU)	CCM305	2	5	–	**7**	CCM204
Scientific Meetings & Workshops II	SCI306	2	3	–	**5**	SCI302
Semester 6 Total Credit Points		**8**	**20**	**4**	**32**	
Semester 7 (Year 4)						
Subspecialty Neurosurgery I (Spine & Pediatric)	NSC401	3	10	4	**17**	NSC304
Research Progress I (Data Collection)	RES402	2	4	–	**6**	RES207
Journal Club II	SCI403	1	2	–	**3**	SCI303
Semester 7 Total Credit Points		**6**	**16**	**4**	**26**	
Semester 8 (Year 4)						
Subspecialty Neurosurgery II (Functional & Skull Base)	NSC404	3	10	5	**18**	NSC401
Scientific Activities III (Conferences & Case Presentations)	SCI405	2	3	–	**5**	SCI306
Research Progress II (Data Analysis)	RES406	2	4	–	**6**	RES402
Semester 8 Total Credit Points		**7**	**17**	**5**	**29**	
Semester 9 (Year 5)						
Advanced Operative Neurosurgery I (Microsurgery, Endoscopy)	NSC501	4	8	6	**18**	NSC404
Thesis Work I (Data Interpretation)	RES502	3	5	–	**8**	RES406
Scientific Meetings & Journal Clubs IV	SCI503	1	2	–	**3**	SCI405
Semester 9 Total Credit Points		**8**	**15**	**6**	**29**	
Semester 10 (Year 5)						
Advanced Operative Neurosurgery II (Functional, Vascular, Skull Base)	NSC504	4	8	6	**18**	NSC501
Scientific Activities V (Workshops, Seminars)	SCI505	1	3	–	**4**	SCI503
Semester 10 Total Credit Points		**5**	**11**	**6**	**22**	
Semester 11 (Year 6)						
Thesis Completion & Publication	RES601	3	5	–	**8**	RES502

Course Title	Code/No.	Theoretical Credit Points	Clinical Credit Points	Operative Credit Points	Total Credit Points	Pre-Requisites
Advanced Operative Neurosurgery III (Complex Cases & Supervised Independence)	NSC602	3	10	4	**17**	NSC504
Optional Scientific Program (Selected Topic in Neurosurgery)	OPT603	2	3	–	**5**	Supervisor approval
Semester 11 Total Credit Points		**8**	**18**	**4**	**30**	
Semester 12 (Year 6)						
Thesis Defense & Final Exam	EXM604	–	8	–	**8**	RES601
Final Presentation & Scientific Discussion	SCI605	–	4	–	**4**	SCI505
Research Publication & Conference Participation	PUB606	2	8	–	**10**	RES601
Semester 12 Total Credit Points		**2**	**18**	**–**	**22**	
PART II – ADVANCED NEUROSURGERY (Years 3–6) Total Credit Points		**53**	**131**	**34**	**220**	
Full Program Total Credit Points (Part 1 + Part 2)		**105**	**189**	**45**	**360**	

Matrix of Mapping Program PILO's with Courses

▪ Knowledge and Understanding (A)

NO	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A10.1	A10.2	A10.3	A10.4	A10.5	A10.6	A10.7	A10.8	A10.9	A10.10	A10.11	A10.12
1	General Surgery (Head & Neck focus)	✓									✓	✓				✓		✓				✓	
2	General Medicine (Neurology & Endocrinology)		✓	✓			✓				✓	✓		✓	✓	✓	✓	✓				✓	✓
3	ENT, Ophthalmology & Radiology Rotations			✓		✓		✓				✓				✓							✓
4	Medical Statistics																			✓			
5	Research Methodology										✓								✓	✓			
6	Medical & Research Ethics										✓								✓				
7	Scientific Activities I (Seminars / Journal Clubs / Workshops)										✓								✓	✓			✓
8	Integration Course (Clinical Correlations)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Anatomy of CNS & PNS (+ Embryology)		✓										✓	✓	✓	✓	✓						
10	Neuropathology (Gross & Microscopic)									✓	✓	✓	✓									✓	
11	Neurophysiology				✓							✓		✓	✓	✓	✓						
12	Critical Care & Anesthesiology								✓			✓		✓		✓	✓	✓					✓
13	Pharmacology for Neurosurgery										✓	✓						✓					
14	Basic Clinical Neurosurgery (ER / Ward / OPD)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	Research Proposal & Thesis Planning										✓								✓	✓			
16	Scientific Activities II (Seminars / Proposal Presentation)										✓								✓	✓			
17	Advanced Clinical Neurosurgery I (Cranial, Spinal, Emergency)	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	Departmental Seminars & Workshops I										✓	✓							✓	✓			
19	Journal Club I										✓								✓	✓			
20	Advanced Clinical Neurosurgery II (Vascular, Tumor, Trauma)	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
21	Critical Care Rotation (Neuro ICU)								✓		✓	✓		✓		✓	✓	✓					✓
22	Scientific Meetings & Workshops II										✓	✓							✓	✓			✓
23	Subspecialty Neurosurgery I (Spine & Pediatric)	✓	✓						✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓

NO	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A10.1	A10.2	A10.3	A10.4	A10.5	A10.6	A10.7	A10.8	A10.9	A10.10	A10.11	A10.12
24	Research Progress I (Data Collection)										✓								✓	✓			
25	Journal Club II										✓								✓	✓			
26	Subspecialty Neurosurgery II (Functional & Skull Base)	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	Scientific Activities III (Conferences & Case Presentations)										✓	✓							✓	✓			✓
28	Research Progress II (Data Analysis)										✓								✓	✓			
29	Advanced Operative Neurosurgery I (Microsurgery, Endoscopy)	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓
30	Thesis Work I (Data Interpretation)										✓								✓	✓			
31	Scientific Meetings & Journal Clubs IV										✓								✓	✓			
32	Advanced Operative Neurosurgery II (Functional, Vascular, Skull Base)	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	Scientific Activities V (Workshops, Seminars)										✓	✓							✓	✓			✓
34	Thesis Completion & Publication										✓								✓	✓			
35	Advanced Operative Neurosurgery III (Complex Cases & Supervised Independence)	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	Optional Scientific Program (Selected Topic in Neurosurgery)	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	Thesis Defense & Final Exam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	Final Presentation & Scientific Discussion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	Research Publication & Conference Participation										✓								✓	✓			✓

Matrix of Mapping Program PILO's with Courses

▪ Intellectual Skills (B)

No	Course Title	B1	B2	B3	B4	B4.1	B4.2	B4.3	B4.4	B5	B6	B7	B7.1	B7.2	B7.3	B8	B9	B10	B11	B12	B12.1	B12.2	B12.3	B13	B13.1	B13.2	B13.3	B14	B15	B15.1	B15.2	B15.3	B16
1	General Surgery (Head & Neck focus)	✓	✓		✓	✓			✓			✓	✓	✓	✓	✓																	
2	General Medicine (Neurology & Endocrinology)	✓	✓	✓																✓	✓												
3	ENT, Ophthalmology & Radiology Rotations	✓	✓								✓			✓																		
4	Medical Statistics		✓																														
5	Research Methodology		✓																														
6	Medical & Research Ethics																																
7	Scientific Activities I (Seminars / Journal Clubs / Workshops)	✓	✓																														
8	Integration Course (Clinical Correlations)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
9	Anatomy of CNS & PNS (+ Embryology)	✓													✓	✓	✓									✓							
10	Neuropathology (Gross & Microscopic)	✓	✓													✓			✓	✓	✓												
11	Neurophysiology	✓	✓													✓													✓	✓	✓		
12	Critical Care & Anesthesiology	✓	✓	✓							✓			✓	✓			✓															
13	Pharmacology for Neurosurgery		✓																									✓	✓	✓	✓		
14	Basic Clinical Neurosurgery (ER / Ward / OPD)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
15	Research Proposal & Thesis Planning		✓																														
16	Scientific Activities II (Seminars / Proposal Presentation)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
17	Advanced Clinical Neurosurgery I (Cranial, Spinal, Emergency)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
18	Departmental Seminars & Workshops I	✓	✓	✓							✓			✓	✓	✓	✓	✓															
19	Journal Club I	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
20	Advanced Clinical Neurosurgery II (Vascular, Tumor, Trauma)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

No	Course Title	B1	B2	B3	B4	B4.1	B4.2	B4.3	B4.4	B5	B6	B7	B7.1	B7.2	B7.3	B8	B9	B10	B11	B12	B12.1	B12.2	B12.3	B13	B13.1	B13.2	B13.3	B14	B15	B15.1	B15.2	B15.3	B16
21	Critical Care Rotation (Neuro ICU)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
22	Scientific Meetings & Workshops II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
23	Subspecialty Neurosurgery I (Spine & Pediatric)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
24	Research Progress I (Data Collection)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
25	Journal Club II																																
26	Subspecialty Neurosurgery II (Functional & Skull Base)																																
27	Scientific Activities III (Conferences & Case Presentations)																																
28	Research Progress II (Data Analysis)																																
29	Advanced Operative Neurosurgery I (Microsurgery, Endoscopy)																																
30	Thesis Work I (Data Interpretation)																																
31	Scientific Meetings & Journal Clubs IV																																
32	Advanced Operative Neurosurgery II (Functional, Vascular, Skull Base)																																
33	Scientific Activities V (Workshops, Seminars)																																
34	Thesis Completion & Publication																																
35	Advanced Operative Neurosurgery III (Complex Cases & Supervised Independence)																																
36	Optional Scientific Program (Selected Topic in Neurosurgery)																																
37	Thesis Defense & Final Exam																																
38	Final Presentation & Scientific Discussion																																
39	Research Publication & Conference Participation																																

Matrix of Mapping Program PILO's with Courses

- **Professional and Practical Skills (C)**
- **General Skills (D)**

No	Course Title	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1	General Surgery (Head & Neck focus)	✓	✓			✓	✓	✓	✓		✓	✓			
2	General Medicine (Neurology & Endocrinology)	✓	✓	✓		✓	✓	✓			✓	✓			
3	ENT, Ophthalmology & Radiology Rotations	✓	✓			✓	✓	✓			✓	✓			
4	Medical Statistics		✓		✓					✓			✓		✓
5	Research Methodology				✓					✓			✓		✓
6	Medical & Research Ethics					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Scientific Activities I (Seminars / Journal Clubs / Workshops)				✓	✓	✓	✓		✓		✓	✓	✓	✓
8	Integration Course (Clinical Correlations)	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	
9	Anatomy of CNS & PNS (+ Embryology)	✓											✓		
10	Neuropathology (Gross & Microscopic)	✓	✓										✓		
11	Neurophysiology	✓	✓										✓		
12	Critical Care & Anesthesiology	✓	✓	✓		✓	✓	✓			✓	✓			
13	Pharmacology for Neurosurgery		✓								✓				
14	Basic Clinical Neurosurgery (ER / Ward / OPD)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	Research Proposal & Thesis Planning				✓				✓	✓			✓		✓
16	Scientific Activities II (Seminars / Proposal Presentation)				✓	✓	✓	✓		✓		✓	✓	✓	✓
17	Advanced Clinical Neurosurgery I (Cranial, Spinal, Emergency)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
18	Departmental Seminars & Workshops I				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
19	Journal Club I				✓					✓			✓	✓	✓
20	Advanced Clinical Neurosurgery II (Vascular, Tumor, Trauma)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
21	Critical Care Rotation (Neuro ICU)	✓	✓	✓		✓	✓	✓	✓		✓	✓			

No	Course Title	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
22	Scientific Meetings & Workshops II				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Subspecialty Neurosurgery I (Spine & Pediatric)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
24	Research Progress I (Data Collection)		✓		✓				✓	✓			✓	✓	✓
25	Journal Club II				✓					✓			✓	✓	✓
26	Subspecialty Neurosurgery II (Functional & Skull Base)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
27	Scientific Activities III (Conferences & Case Presentations)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Research Progress II (Data Analysis)		✓		✓				✓	✓			✓	✓	✓
29	Advanced Operative Neurosurgery I (Microsurgery, Endoscopy)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
30	Thesis Work I (Data Interpretation)		✓		✓				✓	✓			✓	✓	✓
31	Scientific Meetings & Journal Clubs IV				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
32	Advanced Operative Neurosurgery II (Functional, Vascular, Skull Base)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
33	Scientific Activities V (Workshops, Seminars)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34	Thesis Completion & Publication				✓				✓	✓			✓	✓	✓
35	Advanced Operative Neurosurgery III (Complex Cases & Supervised Independence)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
36	Optional Scientific Program (Selected Topic in Neurosurgery)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	Thesis Defense & Final Exam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	Final Presentation & Scientific Discussion				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	Research Publication & Conference Participation				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Teaching Strategy		
N	**Teaching Strategy**	**Description**
1	Case-based discussions	Learners analyze and discuss real or simulated clinical cases to develop diagnostic reasoning, problem-solving skills, and application of theoretical knowledge to practice.
2	3D neuroanatomy visualizations	Interactive 3D models and animations used to explore complex brain and nervous system structures, enhancing spatial understanding of neuroanatomy.
3	Audience response systems	Technology (e.g., clickers, mobile apps) used to poll learners during sessions, encouraging participation, immediate feedback, and assessment of understanding.
4	Cadaver/synthetic model dissections	Hands-on exploration of human or artificial specimens to learn detailed anatomy, surgical approaches, and spatial relationships between structures.
5	Suturing/hemostasis practice	Repetitive practice of wound closure and bleeding control techniques on models or simulators to build technical proficiency and muscle memory.
6	Instrument handling	Training focused on proper use, grip, and control of surgical instruments to develop precision and efficiency in operative tasks.
7	Small group case analysis	Students collaboratively evaluate clinical scenarios in small teams, promoting teamwork, communication, and deeper comprehension of clinical reasoning.
8	Progressive disclosure format	Information about a case is revealed step-by-step, mirroring real clinical reasoning processes and encouraging hypothesis generation and refinement.
9	Faculty-guided debriefs	Post-activity discussions led by instructors to reflect on performance, clarify misunderstandings, and consolidate learning objectives.
10	High-fidelity mannequin scenarios	Realistic simulations using advanced mannequins that mimic patient physiology to train in acute care, crisis management, and teamwork.
11	Virtual surgery simulators	Computer-based platforms that replicate surgical environments, allowing learners to practice operative techniques safely and repeatedly.
12	Role-play exercises	Learners act out clinical interactions (e.g., doctor–patient communication) to build empathy, communication, and professionalism skills.
13	Supervised OR assistances	Learners assist in actual operating rooms under expert supervision, gaining real-world exposure to surgical workflow, teamwork, and aseptic techniques.
14	ICU patient management	Bedside or simulated training in critical care settings to develop decision-making, monitoring, and multidisciplinary management of complex patients.
15	Outpatient clinics	Direct involvement in ambulatory patient care, emphasizing history-taking, physical exams, and longitudinal management of common clinical conditions.

Assessment Strategy		
No	**Assessment Strategy**	**Description**
1	**Supervision and Monitoring**	Supervision and monitoring of the training program are conducted according to the Faculty of Medicine at 21 September University By-laws for Practical Training Programs. Each student is assigned a specific supervisor from the department's faculty members who oversees the student throughout the training period in Part II of the program. The supervisor submits periodic reports to the program coordinator regarding the student's progress and continuity in training. These reports are presented annually to the Department Council for approval of the student's progression to the next academic year.
2	**Continuous Assessment**	Professors carry out continuous assessment throughout the program to ensure consistent monitoring of student performance, professional development, and achievement of intended learning outcomes.
3	**Practical Training Logbook**	A practical training program logbook will be kept for each candidate to document all his/her practical activities as well as his/her participation in different scientific activities.
4	**Thesis Preparation and Evaluation**	The MD in Neurosurgery program is distinguished by including both a clinical training component and a scientific research thesis. The thesis is conducted under the supervision of at least two academic supervisors. The primary supervisor must be the student's main academic mentor during the clinical training, while the second supervisor should be either the program coordinator or a faculty member holding at least the rank of Associate Professor in Neurosurgery, from within the department, the Faculty of Medicine, or another recognized institution. A third supervisor from outside the Department of Neurosurgery may be appointed if the research topic involves another specialty. The thesis is assessed according to the faculty's regulations and contributes to the final evaluation and awarding of the MD degree.
5	**Completion and Eligibility for Final Exam**	The head of the department should allow the candidates to undergo the final exam when they complete their training program and collect the credit points needed.
6	**Written Examination**	• Day 1: - paper I: Neurosurgery (essay questions). - paper II: Neurosurgery (multiple choice questions). • Day 2: - paper III: Surgical Anatomy (essay and multiple-choice questions). - IV: Clinical Neurophysiology and Surgical Pathology (essay and multiple-choice questions). • Day 3: - paper V: Case study.
7	**Clinical Examination**	Day 4: Long and short cases.

8	**Oral Examination**	Day 5: Clinical discussions.

Study methods and system in the program:
Study system: Integrated competency-based medical education
Study methods in the program: Lecture-based + Clinical practice)
Number of years needed for completion of the program: 6 years
Total credit hours required to award the degree: 130 credit Hours

Admission Requirements for the Program	
Requirement	**Details**
Academic Qualification	Applicant must hold an MD, BCH, or an equivalent degree with a minimum grade of "Good."
Internship Attendance	Completion of the required internship (housemanship) period is mandatory.
Certification from Medical Council	Applicant must obtain official certification from the Medical Council confirming that they are not currently enrolled or will not be enrolled in another postgraduate study program.
Evaluation Exam	Applicant must pass the evaluation examination conducted for MD program applicants.
Employment Status	Applicant must not be engaged in any other job outside the MD education program during their study period.
Educational Courses and Research	Applicant must complete and pass all required educational courses and research work specified for the MD program.
Financial Requirements	Applicant must pay all required annual fees and accounts as determined by the university.
Additional University Requirements	Applicant must meet any other conditions or requirements that may be applied by the university administration.

Graduation Requirements:

1. **Total Credit Hours Required: 360**
2. **Program duration:** Six years.
3. **Clinical training:** According to the bylaws for the postgraduate programs, the MD trainees should complete the requirements mentioned needed for the two parts of the MD education program in order to acquire the needed credit points.
4. **MD thesis:**
   - The MD degree students should prepare a thesis in neurosurgery, the research and ethical committee must approve the proposal of the research.
   - It should be supervised by one or more senior staff members and may include other

specialties.

- Research from the thesis should be published at one of the scientific journals.
- It should be evaluated and approved by a committee of three professors including one of the supervisors and an external professor.

Resource and equipment's needed for Program Implementations

Resources and Equipment Needed for Program Implementation

1. Learning Resources

- **Textbooks & References:**
  - Neuroanatomy atlases (e.g., *Netter's Neuroscience*).
  - Neurosurgery textbooks (e.g., *Youmans and Winn Neurological Surgery*).
  - Peer-reviewed journals (*Journal of Neurosurgery*, *Neurosurgery*).
- **Digital Databases:**
  - PubMed, Scopus, UpToDate (for evidence-based practice).
  - E-learning platforms (e.g., Moodle/Blackboard for course materials).
- **Simulation Software:**
  - Virtual dissection tools (e.g., *Complete Anatomy*).
  - Neurosurgical simulators (e.g., *NeuroVR*, *Surgical Theater*).

2. Educational Tools & Equipment

- **Anatomy/Surgical Instruments:**
  - Brain/spine anatomical models.
  - Basic surgical kits (scalpels, forceps, bone drills).
  - Suture training kits.
- **Visualization & Recording:**
  - Surgical monitors for live demonstrations.
  - High-definition surgical cameras.
- **Diagnostic Tools:**
  - MRI/CT scan case libraries.
  - EEG simulators.

3. Laboratories & Facilities

- **Anatomy Lab:**
  - Dissection tables with tools.
  - Preserved specimens (brain, spinal cord).
- **Surgical Skills Lab:**
  - 3D neurosurgery simulators.
  - Procedure-specific models (e.g., shunt placement).
- **Computer Lab:**
  - Radiology analysis software (e.g., OsiriX).
  - Electronic Medical Record (EMR) systems.

4. Clinical Facilities

- **Operating Rooms (ORs):**
  - Microsurgical equipment, neuronavigation systems.
  - Intraoperative MRI/CT.
- **Neuro-ICU:**
  - Intracranial pressure (ICP) monitors.

- Ventilators for neurocritical care.
- **Outpatient Clinics:**
  - Specialty clinics (e.g., neuro-oncology, vascular).

5. Human Resources

- **Faculty:**
  - Board-certified neurosurgeons with teaching experience.
  - Anatomy/simulation lab technicians.

Academic Staff:			
	Proof.	Associate Proof.	Asst Proof.
Needed Staff	**1**	**1**	**2**
Current Staff	**1**	**2**	**4**
Notes			

Program evaluation and improvement		
Targeted	**Assessment method**	**Sample**
students	**Course feedback surveys**	**All enrolled students**
Faculty Peer reviews,	**Peer reviews, academic audits**	**All teaching staff**
Alumni	**Graduate tracer studies**	**Selected graduates from past 3 years**
Employers	**Structured feedback forms/interviews**	**Hospitals, health institutions**
Curriculum Committee	**Annual program review meetings**	**Committee members**