**SPPA 6160-101**
**Neurological Bases of Speech and Language Disorders, Fall Semester 2012**
Subhash C. Bhatnagar, Ph.D.

## I. How and When to Reach me

Email: Subhash.bhatnagar@marquette.edu
Telephone 288-3390
*Office:* *Cramer Hall – 230H*
Office Hrs: Tuesday 10:00-11:00
Wednesday 4:00-5:00 or by Appointment

## II. Course Objectives:

After completing this course, students should be able to:

- Explain normal functional anatomy of the brain;
- Define the clinical concepts of neuroanatomy, neuroembryology, neuroradiology, neurophysiology, neurohistology, and clinical neurology;
- Explain the physiology and anatomy of the motor and sensory (somatic, visual, auditory, and proprioception) systems;
- Describe brain circulatory mechanisms;
- Relate neuroanatomy to systems and diseases;
- Apply neuroscience to human behavior with special reference to communicative skills and other pertinent behaviors important to Speech-Language Pathologists.

## III. **Required Texts**:

1. **BS**: Bhatnagar, Subhash. *Neuroscience for the Study of Communicative Disorders*. Baltimore, Lippincott Williams and Wilkins. RC 423.B53, 2013.

## **Reference Texts**:

1. Taber's Cyclopedic Medical Dictionary,. 21st.th Edition. Philadelphia, F.A. Davis. RC 121.T18. 2009.
2. Digital Anatomist. Health Science Center for Education. Post. Box 357161 University of Washington. Seattle 98195-7161 digital.anatomist.com

3. **DH**: Duane E. Haines. Neuroanatomy: An Atlas of Structures, Sections and Systems. 7th Edition. Maryland, Urban and Schwarzenberg, QM451 .H18 20048.

## IV. ASHA Certification Standards and DPI Requirements

Satisfactory completion of this graduate class is intended to assist students in meeting the following clinical skills and academic knowledge required for the American Speech-Hearing-Language Association (ASHA) Standards for the Certificate of Clinical Competence in Speech-Language Pathology

Standard IIIA. Knowledge of the principles of biological sciences related to human behaviors-speech/language/cognition.

Standard IIIB. Knowledge of basic human communication processes including their biological, neurological , acoustic, physiological, developmental and linguistic and cultural basesissues.

Standard IIIC. Knowledge of the nature of speech/language and communicative disorders including etiologies, anatomical, physiological, linguistic and cultural attributes in the areas of expressive and receptive language

Standard IIID. Knowledge principles and methods of prevention, assessment, and intervention for people with communication disorders including consideration of anatomical/physiological, psychological, developmental and linguistic and correlates of the disorders in the area of expressive and receptive language and the impact on speech and language.

## WI-DPI Standards

Satisfactory completion of this course assists you in meeting the following requirements for WI-DPI Licensure
Standard 1 a,e,
Standard 2. Learning a-e
Standard 2, Applications a and d.
Standard 3, e
Standard 5. a-d.
Standard 6. a-e
Standard 8.
Standard 9. a-g

## V. Requirements and Grading:

- **Four objective sectional examinations**. Each test will cover lectures, lab material, textbook readings, and assignments discussed before the exam date.
  - 84 points
- **10 completed quizzes**.
  - 10 points
- Studying **laminated labeled brains** for 5 hours in the neuro lab. Time spent needs to be documented and cannot be completed in less than four lab visits.
  - 2 points

- **Navigating Digital Anatomist Software** for 4 hours. Documented log needs to be submitted
  - 1 point
- Viewing 4 **video tapes** in the Rayner Library. To be documented; see the attached form.
  - 2 point

- Writing and presenting 2 multiple choice case study questions
    - 1 point

**Requirement Summary**

| | |
|---|---|
| • Examinations | 84 Points |
| • Quizzes | 10Points |
| • Laminated Brains | 2 Points |
| • Digital Anatomist | 1 Point |
| • Videotapes | 2 Points |
| • MC Questions | 1 Point |

Each Exam is given only at the scheduled time. Failure to take an exam will result in 0 point. There are no make-up exams, unless you present me with an official excuse (see the absence policy).

**Grading Scale:**

| | |
|---|---|
| **A** | **95-100** |
| **AB** | **90-94** |
| **B** | **85-89** |
| **BC** | **80-84** |
| **C** | **75-79** |

VI. Attendance Policy

Since each lecture in this graduate class deals with important clinical/functional information, you are expected to attend every class and lab. On time attendance in class and lab is an important part of professional behavior. Any absence prevents you from getting the proper benefit of the course. The instructor does not differentiate between "excused" and "unexcused" absences. Tests missed because of an absence cannot be made-up unless an official excuse is presented. Make up tests can only be given during final exam week. Regardless of reason(s) for the absence, the student will be responsible for the material covered in the class.

Acceptable anticipated absences (departmental norm):

- The student is away from campus representing an official university function, e.g., participating in a professional meeting, as part of a judging team, or athletic team.
- Required court attendance as certified by the Clerk of Court.
- Religious observances when certified by a letter from the student's parent(s) or religious leader.

- Required military duty as certified by the student's commanding officer.

Acceptable emergency absences:

- Illness or injury when certified by an attending physician, dentist, or nurse. The certification should show the date service was provided to the student but should not describe the nature of that service.
- Death or serious illness in the immediate family (parents, step-parents, siblings, spouse, children, step-children, foster children, in-laws, sibling in-laws, grandparents, great grandparents, step-great grandparents, grandchildren, aunts, uncles, nieces, and nephews) when certified by a letter from the student's parent(s) or spouse.

## VII. Marquette University Policy on Multiple Exams

If a student has **four** exams in one day, the student has the option to ask **all four instructors** about the possibility of changing the exam to another time. If none of the four instructors agrees, or if they changed exam time does not fit the student's schedule, the student may contact the College or Registrar staff about the possibility that they might proctor a special exam time with the student, if the instructor agrees.

## VIII. Policy on Academic Dishonesty

Please refer to the following website regarding guidelines and disciplinary procedures relating to academic misconduct:

http://www.marquette.edu/academics/regulations/acaddishonesty.html

## IX. Disability related Issues

**Please see me as soon as possible if you require any accommodations because of a disability.**

## X. Dates to Remember:

| | | |
|---|---|---|
| September | 25 | Examination One |
| October | 25 | Examination Two |
| October | 30 | No Class |
| November | 15 | Examination Three Question presentation |
| December | 12 | Examination Four |

## XI. Changes in Lab Schedule: Late start time is 1:30

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|---|---|---|
| August | 28 | No Lab scheduled |
| *September | 27 | Late start |
| *October | 2 | Late start |
| **October | 4 | Late start |
| **October | 9 | Late start |
| ***October | 30 | No Class and No Lab |

*November 6 Late lab start
**November 27 Late lab start
**November 29 Late lab start

**Class Activities**

**August 28 (No Lab)**
Course orientation
**Reading: Syllabus**

**August 30**

OVERVIEW

- Scope and Applications of Neuroscience
- Relationship between Neuroscience and Speech Language Pathology
- Nature of Training in Neuroscience
- Basic Philosophies Regulating Brain Functioning

**READING: BS: Chapter 1, pp. 1-32**

*TECHNICAL TERMS AND BASIC CONCEPTS*

- Axial organization
- Brain sections
- Directions
- Medical lexicon
- Visual orientation
- Functional components of the CNS
- Architectural maps
- Anatomical and Clinical Orientation
- Lesion Localization Rules

**READING: BS: Chapter 1, pp. 1-32**

**September 4, 6, 11, 13, 18, 20**

*REGIONAL ANATOMY OF THE BRAIN*

- Divisions of the brain
  - Prosencephalon
  - Mesencephalon
  - Rhombencephalon (Cerebellum, pons, and medulla)
- FOREBRAIN
  - Telencephalon
    - Neocortex: structures and locations
    - Diencephalon:
      - Thalamus: location & structures
      - Hypothalamus: location and structures
    - Mesencephalon

- Rhombencephalon
  - Cerebellum, pons, and medulla

**READING: BS: Chapter 2, pp. 35-65**

- ANATOMY OF THE SPINAL CORD
  **READING: BS: Chapter 2, pp. 65-71**

- VENTRICLES:
  **READING: BS -Chapter 2, pp. 71-73**

- AXONAL CONNECTIONS
  **READING: BS: Chapter -2, pp. 73-77**

- MENINGES
  **READING: BS: Chapter 2, pp. 73-84**

- CRANIAL NERVES
  **READING: BS: Chapter 2, pp. 84-87**

- Autonomic Nervous System
  **READING: BS: Chapter 2, pp. 87-89**

- THE CEREBRAL CORTEX: FUNCTIONAL ORGANIZATION
  **READINGG: BS: Chapter 19, pp. 441-443.**

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September 25 **EXAMINATION ONE**
(Class meets after the examination)

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**September 27**
**INTERNAL MORPHOLOGY OF THE NEURAXIAL SYSTEM**

- Transverse Sections of the Spinal Cord
  READING**: BS: Chapter 3. pp. 95-100**
- Cross Section of the Brain stem (Medulla/Pons/Midbrain)
  - o Medulla oblongata
    **READING: BS: Chapter 3, pp. 100-106**
  - o Pons
    **READING: BS: Chapter 3, pp. 106-109**
  - o Midbrain
    **READING: BS: Chapter 3, pp. 109-115**
- Coronal Sections of the Forebrain (Basal Ganglia and Diencephalon)
  **READING BS: Chapter 3, pp. 115-123**
  - # Horizontal Sections of the Brain

**READING: BA: Chapter 3, pp. 123-131**

**October 2-4**

- CELLULAR ORGANIZATION AND FUNCTIONING
  **READING: BS: Chapter 5, pp. 152-1168**

**October 9**

- DIENCEPHALON
  **READING: BS: Chapter 6, pp. 175-185**

**October 11-16**

- NEUROEMBRYOLOGICAL DEVELOPMENT OF THE CNS.
  **READING: BS: Chapter 4, pp. 133-150**

**October 16**

- CIRCULATORY SYSTEM
  - Blood Circulation. (Also See the coverage in SPPA 249)
    - Functions
    - Vascular Anatomy
    - Clinical Considerations

    **READING: BS: Chapter 7, pp. 186-211**
- Cerebral Spinal Fluid System
  - Functions
  - Neuroanatomy
  - Clinical Considerations

    **READING: BS: Chapter 8, pp. 212-218**

**October 23**

- VISUAL SYSTEM (Examination Three Material)
  **READING: BS: Chapter 12, pp. 273-293**

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**October 25 Examination Two**

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**October 30 No Class**

**November 1**

- AUDITORY SYSTEM
  **READING: BS: Chapter 9, pp. 225-238**

**November 6**

- VESTIBULAR SYSTEM
  **READING: BS: Chapter 10. pp. 240-250**

**November 8-13**

- SOMATOSENSORY SYSTEM
  **READING: BS: Chapter 11, pp. 251-272**

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**November 15** **Examination Three,**
(Class meets after examination)

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**November 20**

Axial Brain
**READING: BS: Chapter 17, pp. 360-412**

**November 22 Thanksgiving Break**

**November 27 and 29**

MOTOR SYSTEM

- Spinal Cord System
  **READING: BS: Chapter 13, pp. 295-315**
- Cerebellar System
  **READING: BS: Chapter 14, pp. 316-326**
- Basal Ganglia
  **READING: BS: Chapter 15, pp. 328-345**
- Motor Cortex
  **READING: BS: Chapter 16, pp. 346-358**

**December 4 and 6**

- Rules for Localizing Lesions Chapter 1, pp. 30-31
- Solving Clinical Problems

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Wednesday, December 12:
Examination Four/Final
8:00–10:00 AM

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**SPPA 6160-101**
**Neurological Bases of Speech and Language Disorders**

**Laboratory Assignments**
**Lab Locations:** 1. Cramer Hall 004.
CHS Anatomy Laboratory

Contact info: mari.bliss@marquette.edu
847-754-0535

The laboratory component supplements the learning of clinical neuroscience by incorporating visual approach to simplify neuroanatomical complexities and promote analytical skills. The activities listed under each lab day are intended to coincide or relate with the topics that are discussed either the same or next day in the class.

Most of the instructional videotapes (**) viewed during the lab sessions are **on reserve** and are available to you in the **University Library (basement)**. Repeated reviewing of the tapes will enhance your understanding of complex neurological concepts. All viewing of the videotape will be followed by a question/discussion session.

***Late start time is 1:30**

**Assigned Laboratory Activities:**

****August 28**
**No lab scheduled**

**August 30**
- Orientation to **Digital Anatomist Software**
- Orientation to **Labeled and Plastic-framed Brain Sections**

**September 4**
- "Secrets of the Mind" followed by a discussion
  - RC351 .S43 2001

**September 6**
- "Cerebral Hemispheres, Lobes, Sulci and Gyri." S-V Series (22).
  - QM 455 .H42, 1986. Tape 5
- Identification of major cortical structures
  - Textbook Figures: 2.1 to 2.11. .

**September 11**
- "Midsagittal Section", (24). S-VMS,
  - QM 455. H42, Tape 4

- Identification of major cortical structures using the Figures from the textbook: 2.3, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.13, 2.14, 2.15, 2.16, 2.20, 2.21, & 2.39
- Discussion

**September 13**

- "Basal Surface and Cranial Nerves", (15). S-V Series, QM 455 .H42, 1986. Tape 3
- "Brainstem and Cerebellum", (16). S-V Series , QM 455. H42, 86, Tape 11
- Discussion

**September 18**

- The brainstem External Features-Self-Evaluation (25).
  - AGC, QM 455 .N48 V. 23
  - Dissuasion

**September 20**

- “Cerebral Localization of Functions.” Part V. A. AGC (36)
  - QM 455 .N48 V. 14

  Discussion

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**September 25 Examination One (Lab Time).**

The class meets after the examination.

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***September 27**

- **Late start**
- Internal Structure Of The Brain
  - QM455 .I58 1987

***October 2**

- **Late Start**
- Internal Structures of the Brain: Examination (31). AGC
  - QM 455.I582 1987
- Discussion

****October 4**

- **Late Start**
- Blunt Dissection of Major Pathways I, (24) S-V Series.
  - QM 455 .H42, 86. Tape 6
- **"Ventricular System II. Fornix, Hippocampus, & Amygdala", (18) S-V Series.
  - QM 455 .H42, 1986: Tape 9.
- Discussion

****October 9**

- **Late Start**
- "Introduction, Nerve Cell and Brain Membrane" (27) :S-V Series

- QM 455. H42, 1986, Tape 1
- Discussion

**October 11**

- Blunt Dissection of major pathways II, (23)
  - S-V Ser., QM 455 .H42, 86. tape 7
- Discussion

**October 16**

- Human Embryology Series
  - Highlights of reproduction and prenatal development (16)
    - QM 601. H852 V.1
  - Formation of Sex Cells and Chromosomal Abnormality l (14) AGC.
    - QM 601. H852 V.2
  - Formation of Sex Cells and Chromosomal Abnormality ll (14)
    - AGC. QM 601. H852 V.3tures

**October 18**

- Fetal Alcoholic Syndrome and Other Drug Use During Pregnancy. Princeton, N.J. : Films for the Humanities & Sciences: RG 629 .F45, F47, 1992

**October 23 (this material will be covered on examination three)**

- Ophthalmic Optics: Refraction by the eye. AGC. (10).
  - QP 476.067, 1975. V.3.
- Ophthalmic Optics: Refractive Errors and Optical Aberrations. AGC (10).
  - QP 476, 067, 1975. V.4. minutes

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**October 25--Examination Two**

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****October 30 No Lab and No Class**

**November 1**

- (Gross Anatomy Lab, Dental School)
  Meet at the student lounge in Cramer Hall at 12:45)
  - Examination of the important anatomical structures on the dorsal/ventral/lateral/midsagittal surfaces of the brain.
  - Examination of the brainstem structure

***November 6**

**-Late Start**

- Examination of structures using a coronal/ sections of the brain.
- Dissection and examination of the Brainstem.
- Examination of the brain into horizontal sections. Review

**November 8**

- Compensation for Head Movements: Vestibular System S-V Series (17).
  - QM 455. A52 V.5

**November 13**

?Pathway for Pain Temperature and Touch Sensation (18)".
QP 431 . P37.1986

- ?Trigeminal System": (Personal Tape)
- Bodily Sensation I. Conducting Systems of Cord and Stem. (20).
  - AGC QM 455 .A52 V.8.

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**November 15 Examination Three**
(Class meets after the examination)

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**November 20**

- The Autonomic Nervous System: Part 1: The Sympathetic System. (20).
  - AGS QP 368.5 A98 1994
- **The Autonomic Nervous System: Part II: The Parasympathetic System. (21) AGS.
  - QP368 .A98 1994

**November 24 Thanksgiving**

****November 27**

**-Late Start**

- Cerebrovascular system (29)
  - QM455 .H42, 1986
- Examination of Vascular Pathologies (Slides)

****November 29**

- **Late Start**
- Examination of Vascular Pathologies (Slides)
- "Basal Ganglia (16)", Tape S-V Series.
  - QM 455. H42, 1986. Tape 10
- "Performance of Skills. the Pyramidal System.
  - Qm 455 A 52, Vol 10

- **December 4-6**
  - Question presentation
  - Case Studies: Neurological Problem Solving
  - Case Studies: Neurological Problem Solving

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**December 12 Fourth examination**
**8:00-10:00**

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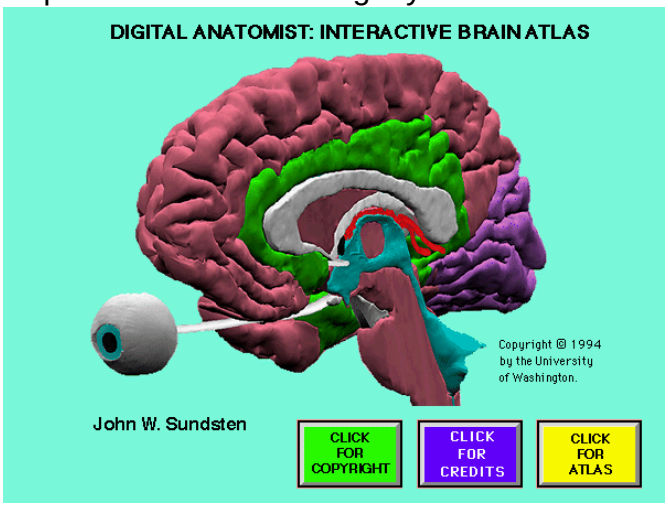
## Student Digital Anatomist Guidelines

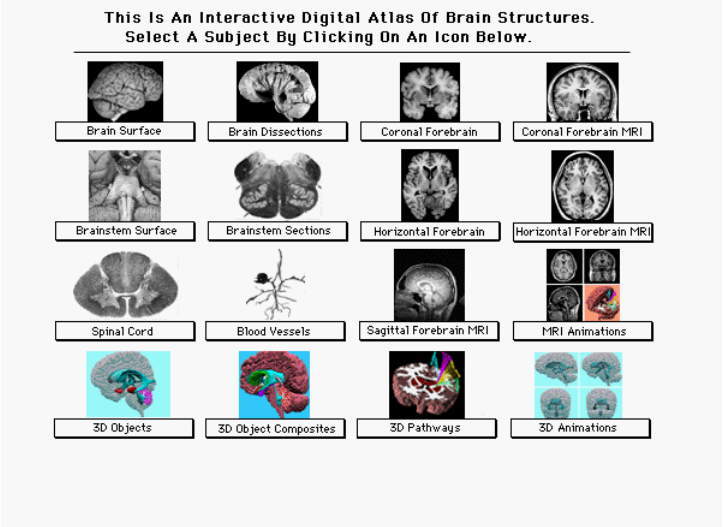
1.) Google ‘Digital Anatomist’.
   a. Click on the link labeled Digital Anatomist Interactive Atlases
      It should be the first link listed.
      Or, go to http://www9.biostr.washington.edu/da.html

2.) Click ‘Brain’ under Atlases
   a. It should be the first selection listed in the Atlases.

3.) You should see this picture. Click the far right yellow button labeled ‘Click for Atlas’




4.) You are then able to view various anatomical illustrations. Click on any view, and the program will take you there.




5.) The navigation bar on the bottom of the screen will guide you as you use the site.

You can go to the main page (shown above) by clicking on the house.

The Question mark will take you to a detailed outline of the site that also includes more detailed directions. The arrows allow you to move forward and backward through the slides. The blue and white paper provides the table of contents.

6). In order to identify the structure, put the arrow on the structure and right click.

7.) There are also quizzes available on the bottom of each page of illustrations (scroll down). You do need to have Java installed in order to use them.

7.) Document the time and the date each time you log into the site.

## Additional Online Resource: Anatomy.tv

**Instructions**

1. Go to Marquette.edu
2. Click “libraries” under quick links
3. Click “Raynor Memorial Libraries”
4. Click “databases” (blue tab under “find resources”)
5. Under “choose discipline or topic”, scroll down and click on “dentistry”
6. Click on link for “anatomy.tv from Primal Pictures”.
7. Under “regional anatomy” (purple box), click “head and neck”.
8. Exit out of help box
9. Click “MRI” tab at top of page and rotate through slides

**Quiz One: Chapter 1: Essential Neurological Concepts and Principles (Due Date: September 13)**

**Quiz Two: Chapter 2: Gross Anatomy of the Central Nervous System (Due Date: September 20)**

**Quiz Three: Chapter 3: Internal Anatomy of the Central Nervous System (Due Date: October 2)**

**Quiz Four: Chapter 5: Nerve Cell Physiology (Due Date: October 9)**

**Quiz Five: Chapter 6: Diencephalon: Thalamus and Associated Structures (Due Date: October, 11)**

**Quiz Six: Chapter 4: Development of the Nervous System (Due Date: October 16)**

**Quiz Seven: Chapter 7: Cerebrovascular System (Due Date: October 25)**

**Quiz Eight: Chapter 12: Visual System (Due Date: October 30)**

**Quiz Nine: Chapter 11: Somatosensory System (Due Date: November 13)**

**Quiz Ten: Chapters 16: Motor System 4: Motor Cortex (Due Date: December 4)**

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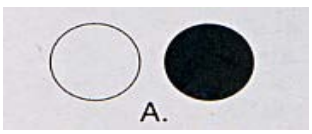
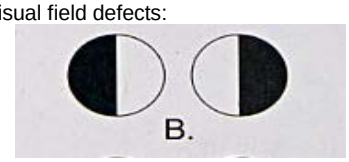
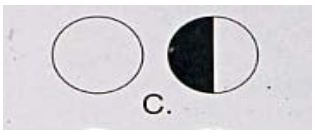
. Name each quarter and side of the visual fields for each eye.

4. Name each of the following visual field defects:






| **Tape** | **Date/Time-Checked Out** | **Signature** |
|---|---|---|
| Introduction, the nerve cell and brain membrane (27). | | |
| Cerebrovascular system (29) | | |
| Basal Surface Cranial Nerves (15) | | |
| Midsagittal section (24) | | |
| Cerebral hemisphere, lobes, sulci and gyri (22) | | |
| Blunt dissection of major pathways, I (24) | | |
| Blunt dissection of Major Pathways, II (23) | | |
| Ventricular system I, choroid plexus (18) | | |
| Ventricular system II, fornix, hippocampus & amygdala (27) | | |
| Basal ganglia (15) | | |
| Brainstem and Cerebellum (16) | | |

## Tapes

Dissection of the Human Brain (Video recordings)/ Lennart Heimer. New York, Springer-Verlag, 1986. (This series is based on Heimer's textbook: "The Human Brain and Spinal Cord")
Science Library. QM455 .H42, 1986: Tapes 1-11

1. Introduction, the nerve cell and brain membrane (27)
2. Cerebrovascular system (29)
3. Basal Surface Cranial Nerves (15)
4. Midsagittal section (24)
5. Cerebral hemisphere, lobes, sulci, and gyri (22)
6. Blunt dissection of major pathways, I (24)
7. Blunt dissection of Major Pathways, II (23)
8. Ventricular system I, choroid plexus (18)
9. Ventricular system II, fornix, hippocampus, and amygdala (27)
10. Basal ganglia (15)
11. Brainstem and Cerebellum (16)

**Additional Tapes:**

1. Inside Information: The Brain and How it Works.
   Sci. AVM. QP 376.I57, 1990
2. "Pathway for Pain Temperature and Touch Sensation" (18)
   QP431 .37, 1986
3. The Mind and the Brain Series (Video recordings), Public Broadcasting Corporation, 1988, QP 376 .M56 [each tape is 30 minutes]

| | |
|---|---|
| 1. Madness | 2. The Two Brains |
| 3. Learning and Memory | 4. Addictions |
| 5. Aging | 6. Development |
| 7. Pain and Healing | 8. Depression |
| 9. Language | 10. Thinking |

**ALTSHUL GROUP CORPORATION TEACHING FILMS**

1. The Brain Series AVM QM451 .N483 (1987)
   Neuroanatomy, 19 (m)
   Neuroanatomy, 20 (M)
   Thalamus and Cortex
   Frontal Lobe

2. Immunology
   A. Immunology QR181.142 5 (1981)
   B. The New Immunology: An Overview, 36(m) QR181.145 (1979)

3. Human Embryology Series AVM QM601 .H852
Highlights of Reproduction and Prenatal Development, 16(vol. 1)
Formation of Sex Cells and Chromosomal Abnormalities I, 14 (vol.2)
Formation of Sex Cells and Chromosomal Abnormalities II, 14(vol.3)

4. The Neuroanatomy Series: The Human Brain in Dissection
AVM QM455 .N48
(vol. 8) Practical Examination in Neuroanatomy, 3rd Ed.: Part I
(vol. 9) Practical Examination in Neuroanatomy, 3rd Ed.: Part II
(vol. 14) Cerebral Localization of Function: Part V (A)
(vol. 19) Brain Dissection: The Rhinencephalon: Part VII(A)
(vol. 22) Brainstem: External Features: Part X
(vol. 23) The Brainstem: External Features – A Self-Evaluation: Part X
(vol. 24) The Cranial Nerve Nuclei: Part X(A)

5. The Anatomical Basis of Brain Function Series
QM455 .A52
(vol. 5) Compensation for Head Movements: Vestibular System
(vol. 8) Bodily Sensation I: Conducting Systems of Cord and Stem
(vol. 9) Bodily Sensation II: Thalamus and Cortex
(vol. 10) Performance of Skills: The Pyramidal System
(vol. 16) Intellect and Organization of Reaction: Frontal Lobe

6. Optics of the Human Eye Series AVM QP476 .O67 (1975)
(vol. 3) Opthalmic Optics: Refraction By the Eye
(vol. 4) Opthalmic Optics: Refractive Errors and Optical Aberrations

7. The Autonomic Nervous System Series
Autonomic Nervous System Part 1: The Sympathetic Division
QP368.5 .A98 (1994)
Autonomic Nervous System Part 2: The parasympathetic & Enteric Divisions QP368.7 .A98 (1994)

8. Muscles of Facial Expression QP327 .M87 (1983)