



# **MAGNETIC RESONANCE IMAGING (MRI) TECHNOLOGIST PROGRAM CATALOG**



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**Certificate of Approval to operate issued by the Division of Private  
Business and Vocational Schools of the Illinois Board of Higher  
Education, 1 North Old State Capitol Plaza, Suite 333  
Springfield, IL 62701**

CATALOG GOOD THRU: JULY 01, 2023 – October 30, 2024  
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# WELCOME

## TO THE *AQUARIUS INSTITUTE*

The *Aquarius Institute* offers comprehensive software and health care educational training and placement assistance in the Chicago land area.

Programs consist of **80-88** weeks of hands-on classroom instructions, depending on the type of program selected.

The professionals at the *Aquarius Institute* are always available to support every student's need. We take a hands-on personal and professional interest from our student's enrollment until after graduation. By providing qualified and skilled instructors, career seminars, and placement assistance in the Chicago land area, we are not only more than capable to educate our students, but to also prepare them for the job market that lies ahead.

## OurMission

**To be the leading provider of career training with a specific interest in high demand job trends in America's ever changing job market.**

## Aquarius Methodology

*Aquarius* Institute provides Healthcare training through the use of adult learning methodology, cutting-edge course content, technology and real hands on practice. In an age of technological globalization, companies must find methods to garner the employee skills and technology and transform it into a competitive advantage. At *Aquarius*, we train our students to enter the business world with the knowledge and skills necessary to add immediate value to a company. However, technical knowledge alone is not enough. But rather, a fine integration of core competencies in knowledge, technical and communication skills empower the individual to deliver value-added work products in a clear and concise manner.

To achieve the aforementioned goal, *Aquarius* stresses the importance of individual attention, state-of-the-art facilities, and clinical internships held at affiliated Health Care Centers.

***\*Check regularly for expanded hours and holidays with your local Aquarius Institute center.***

*Aquarius* provides training in certification programs like ***Ultrasound/Sonography Technician, MRI Technologist, and Licensed Practical Nursing***

**TO ENROLL: 1-847-296-8870**

***Our training is focused on empowering** graduates with the ability to grasp healthcare concepts in the human being which gives them the flexibility to solve healthcare issues that may arise during the course of the life span of clients/patient/customers. Certified professionals earn higher salaries than non-certified professionals; **our professional certification programs give our students the edge in today's demanding job market.***

*Aquarius strives to achieve providing its students with the feeling of complete satisfaction. Student satisfaction is **Aquarius'** motivation to move ahead as one of the leaders in the Allied Health Care Industry.*

## Graduation Guidelines

Graduation depends on the valid marks scored in the examinations conducted at appropriate times after sufficient instruction has been provided. Passing and graduation are based upon the final examination and the percentage of marks scored in all the assignments.

**Note:** Students who achieve a below "C" grade point average are considered to have failed and will need to repeat the Program until they have achieved a passing grade.

## Grading

90 % - or higher	"A"
80% - 89%	"B"
70% - 79%	"C"
60% - 69%	"D"
59% or less	"F"

**Note:** Students who score a below "C" course grade are considered to have failed and will need to repeat the course again until they have completed it successfully with a grade of "C" or above.

## Scoring Procedure

The scoring procedure is determined by successful completion of all take-home assignments and scheduled exams. The number of exams is dependent on the duration of the program. All courses have a minimum of a mid-term and final exam; programs with multiple modules require, on average, one exam per module. Take-home assignments are also dependent on program duration. All exercises, specifically, take-home assignments and examinations, are combined and then averaged to produce a final program grade.

### Scoring Procedure

Homework assignments 10%

Quizzes 20%

Mid-term exam 30%

Final exam 40%

# Attendance

*Besides a grade of “C” or better, **80%** attendance is MANDATORY to be considered for the graduation.*

If a student acquires a sickness or gets into an accident that precludes them from attending classes via the established schedule, the student can retake the program at a later time without any penalty, or if the student wants to drop the program as a result of the aforementioned possibility than the refund policy process is applicable to them.

## Methods of Student Payments

Several payment options are available for registration fees and tuition payment:

- Students can obtain a private educational loan from their desired private bank.
- Students can make their payments by cash/checks.
- Aquarius Institute also accepts student payments via Visa, MasterCard, American Express, or Discover.
- Aquarius Institute has the option of an installment payment plan (see below)

## Installment Plans

Students have the option of paying for their program of choice via an installment plan.

**Tuition Fees:** \$ 21,650.00

*Payment Plan Option:*

*(No interest is charged for using the installment method of payment)*

**Note:** A late fee of \$35 applies to all installment payments not paid on schedule; see installment plan sheet for details.

**TO ENROLL: 1-847-296-8870**

# Retake Policy

*If a student fails in any class of any program, earning a grade below C is considered as failing in any class of the program. The student is required to Retake the class and obtain a grade of C or better to pass. The student is required to pay \$2000.00 to Retake any failed class.*

## Buyers *Right to Cancel*

The student has the right to cancel the *enrollment agreement* until midnight of the 7<sup>th</sup> business day after the enrollment agreement has been signed by the student and the student has been accepted by *Aquarius Institute*; and if the right to cancel is not given to any prospective student at the time the enrollment agreement is signed, then the student has the right to cancel the agreement at any time and receive a refund of all monies paid to date within 10 days of the cancellation.

**Notice of cancellation must be made in writing and sent to:**

*Aquarius Institute*  
1011 E. Touhy Avenue  
Suite 335  
Des Plaines, IL. 60018  
847-296-8870

AQUARIUSINSTITUTE.COM

## Refund Policy

*Aquarius Institute* wants its students to be completely satisfied. Our refund policy allows our students to withdraw from the program up until 60% of the program has been completed. *Our refund policy also follows the guidelines set by Illinois statutes in relation to private business and vocational schools as per 105 ILCS 425.*

**The detailed refund policy is as follows:**

- A. When the notice of cancellation is given before midnight of the 7<sup>th</sup> business day after the enrollment but prior to the first day of class, all application/registration fees, tuition and any other charges shall be refunded to the student.
- B. When the notice of cancellation is given after midnight of the 7<sup>th</sup> business day following acceptance but prior to the close of business on the student's first day of class attendance, *Aquarius* will retain no more than the application/registration fee – which may not exceed \$150 or 50% of the cost of tuition, whichever is less.
- C. When the notice of cancellation is given after the student's completion of the first day of scheduled class attendance, but prior to the student's completion of 5% of the program, *Aquarius* will retain the application/registration fee, an amount not to exceed 10% of the tuition and other instructional charges or \$300.00 - whichever is less, plus the cost of any books or materials, which have been provided by *Aquarius*.

TO ENROLL: 1-847-29

- D. When the student has completed in excess of 5% of the program of instruction, *Aquarius* will retain the application/registration fee, and the cost of any books and materials which have been provided by *Aquarius*, but shall refund a part of the tuition and other instructional charges in accordance with the following:

*Aquarius* will retain an amount computed pro rata by days in class plus 10% of tuition and other instructional charges up to completion of 60% of the program of instruction. When the student has completed in excess of 60% of the program of instruction, *Aquarius* will retain the application/registration fee and the entire tuition and other charges.

- E. Applicants not accepted by *Aquarius* shall receive a refund of all tuition and fees paid within 30 days of the determination of non-acceptance.
- F. Application/registration fee will be \$150.00 at initial enrollment.
- G. Deposits and down payments shall become part of tuition.
- H. All student refunds will be made by *Aquarius* within 30 calendar days from the date of receipt of a student's written cancellation notice.
- I. *Aquarius* will refund all money paid to it under any of the following circumstances:
1. *Aquarius* did not provide the prospective student with a copy of the student's valid Enrollment agreement.
  2. *Aquarius* cancels or discontinues the program of instruction in which the student has enrolled.
  3. *Aquarius* fails to conduct classes on days and times scheduled; detrimentally affecting the student, with the exception below.
- J. Due to bad weather (natural calamities), or due to the instructor's sickness, under this circumstance *Aquarius* Institute will reschedule the classes to make-up for the lost time.
- K. If a student is on a payment plan with *Aquarius* for their tuition payments, the above refund policy is applicable for that student also.
- L. In the event a student withdrawals from a program, or if the student made lesser payments than determined by the refund policy, the student has to make up the difference of payment in 7 days from official withdrawal otherwise collection procedures will begin.
- M. If there is an unresolved problem, please first address your written grievance to the School Director at the following address:  
Aquarius Institute, Corporate Office, 1011 East Touhy Avenue, Suite 335, Des Plaines, IL 60018.

If after first contacting the School Director the grievance relating to the return policy and/or student contract/enrollment agreement remains unresolved, **students may submit complaints** to the following Board of Education office or website:

**Illinois Board of Higher Education**  
1 North Old State Capitol Plaza, Suite 333  
Springfield, IL 62701

Or at [www.ibhe.org](http://www.ibhe.org)

## Job Placement *Assistance*

We have created several programs designed to assist with placing you in the best possible **career** that compliments your specialization in training. Aquarius also conducts regular job fairs with local employers and other career services.

1. Our job placement program starts with an interview performed by our Job Placement Director to help you prepare a dynamic resume illustrating your core-competencies and skill sets.
2. Several companies ask us to submit resumes for different Information Technology & health care skills. We forward to those companies resumes of our graduating students with qualifying performances.
3. Aquarius Institute job placement staff makes frequent calls to legal employers to find possible job openings for the students.
4. **Student Services** facilitate each student's intellectual, academic, social and career development. This reflects respect for cultural, racial, religious, social, intellectual, and economic diversity. Our commitment empowers students to become self-confident, self-reliant, productive, resilient, compassionate, and creative individuals. Services include making copies, resume review, interview skills and job placement assessment and assistance.

### **Note: Graduate Verification**

I understand that if I am responsible to provide the following information as soon as it becomes available, after the completion of the program: Registry/License Exam: Each attempt and Result; Registry/License Number: After passing the exam; Employer's name; Employer's Address; Employer's phone number; Job Title (position held); Name of Supervisor; First day of Employment; Hourly Wage; and Average Hours per Week. AI also has the permission to contact my employer for this information, if needed. I understand that this information will remain confidential and no personal information will be disclosed. Only anonymous statistical calculations are used for the Illinois Board of Higher Education's (IBHE) disclosure statement and the Illinois Department of Financial and Professional Regulations (IDFPR) statistics from AI.

## Computer

Students have access to the computer labs any time during regular hours while enrolled in a class at *Aquarius*. ***Food & drink is not allowed in the computer lab***

## Conduct & Courtesy

Students should conduct themselves in a manner appropriate and conducive to a business / educational environment. Any student involved in obstruction/disruption of the training/business activities, theft, damage of *Aquarius* property, or misconduct, or altercations with a fellow student on Aquarius Institute campus will be subject to dismissal and no refunds will be issued. ***Altercations, Theft or damage will be reported to the police.***



## STUDENT SUGGESTIONS

1. All the students are welcome to put their comments and suggestions into the “Comment, Suggestion and Complaint” box located in the administrative office.
2. If the complaints are not resolved within 5 business days by the administration, the student must see or write to the Director of Education at Aquarius Institute.

## STUDENT COMPLAINTS

1. If there is any problem, please address your written grievance/complaint to:

Director of Education  
Aquarius Institute  
Corporate Office  
1011 East Touhy Avenue Suite 335  
Des Plaines, IL 60018

2. If there is an unresolved problem, please first address your written grievance to the School Director at the above address. If after contacting the School Director the grievance relating to the return policy and/or student contract remains unresolved, students may submit complaints to the following Board of Education office or website:

**Illinois Board of Higher Education**  
1 North Old State Capitol Plaza, Suite 333  
Springfield, IL 62701

Or at [www.ibhe.org](http://www.ibhe.org)

TO ENROLL: 1-847-296-8870

## **EQUAL OPPORTUNITY ASSURANCE STATEMENT**

It is the policy of Aquarius to comply with Section 188 of the Workforce Investment Act of 1998 (WIA), which prohibits discrimination against all individuals in the United States on the basis of race, color, religion, sex, national origin, age, sexual orientation, disability, political affiliation or belief and against beneficiaries on the basis of either citizenship/status as a lawfully admitted immigrant authorized to work in the United States or participation in any WIA Title 1 financially assisted program or activity.

Aquarius complies with Title VI of the Civil Rights Act of 1964, as amended which prohibits discrimination on the basis of race, color, and national origin.

Aquarius complies with the American with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973, as amended, which prohibits discrimination against qualified individuals with disabilities. Responsible to notify the Aquarius administrator prior to enrollment, if student has a need for any instructional accommodations and/or any special learning needs

Aquarius complies with Section 188 of the WIA, which provides that persons with disabilities must be provided with reasonable accommodations and modifications for their disabilities. The section also requires that individuals with disabilities be given services alongside (not segregated from) people without disabilities, unless the program or activity providing services performs an individualized assessment of a particular individual with a disability and concludes that the individual needs special, segregated services.

Aquarius complies with the Age Discrimination in Employment Act of 1975, as amended, which prohibits discrimination on the basis of age.

The Aquarius Institute also assures that it will comply with 29 CFR, Part 37 and all other regulations implementing the laws listed above. The Aquarius Institute is an “equal opportunity employer/program” and “auxiliary aids and services are available upon request to individuals with disabilities.”

If any individual feels discriminated against based on any of the above conditions by an Aquarius Institute staff member, that individual may file a complaint with the director of Aquarius Institute. The director of Aquarius Institute is Jameel Ahmed; he can be reached at (847) 296-8870. If any individual needs to file a complaint, the individual can do so by contacting the director of Aquarius Institute or by writing to Aquarius Institute at 1011 East Touhy Avenue, Suite 335, Des Plaines, IL 60018.

## **SEXUAL HARASSMENT STATEMENT**

The courts have determined that sexual harassment is a form of discrimination under Title VII of the U.S. Civil Rights Act of 1964, as amended in 1991.

### **Policy Statement:**

It is the responsibility of each individual employee and program participant to refrain from sexual harassment, and it is the right of each individual employee and program participant to work in an environment free from sexual harassment.

### **Definition of Sexual Harassment:**

According to the Illinois Human Rights Act, sexual harassment is defined as:

Any unwelcome sexual advances or requests for sexual favors or any conduct of a sexual nature when

1. Submission to such conduct is made either explicitly or implicitly a term of condition of an individual's employment or program participation in a Aquarius Program,
2. Submissions to or rejection of such conduct by an individual is used as the basis for employment or program participation decisions affecting such individual, or
3. Such conduct has the purpose or effect of substantially interfering with an individual's work performance or creating an intimidating, hostile or offensive working environment.

Other conduct commonly considered to be sexual harassment includes:

- Verbal: Sexual innuendos, suggestive comments, insults, humor and jokes about sex, anatomy – or gender – specific traits, sexual propositions, threats, repeated requests for dates, or statements about other employees, even outside of their presence, of a sexual nature.
- Non-verbal: Suggestive or insulting sounds (whistling), leering, obscene gestures, sexually suggestive bodily gestures, "catcalls," "smacking" or "kissing" noises.
- Visual: Posters, signs, pin-ups or slogans of a sexual nature.
- Physical: Touching, unwelcome hugging or kissing, pinching, brushing the body, coerced sexual intercourse, or actual assault.

Sexual harassment most frequently involves a man harassing a woman. However, it can also involve a woman harassing a man or harassment between members of the same gender.

The most severe and overt forms of sexual harassment are easier to determine. On the other end of the spectrum, some sexual harassment is more subtle and depends to some extent on individual perception and interpretation. The trend in the courts is to assess sexual harassment by a standard of what would offend a "reasonable woman" or a "reasonable man," depending on the gender of the alleged victim.

An example of the most subtle form of sexual harassment is the use of endearments. The use of terms such as "honey," "darling," and "sweetheart," is objectionable to many women who believe that these terms undermine their authority and their ability to deal with men on an equal and professional level.

### **Responsibility of Individual Employees or Program Participants:**

Each individual employee or program participant has the responsibility to refrain from sexual harassment in the workplace.

An individual or program participant who sexually harasses a program participant or fellow program participant is, of course, liable for his or her individual conduct.

The harassing employee or program participant will be subject to disciplinary action up to and including discharge or dismissal from employment or the program in accordance with the employment and/or program policy.

All Aquarius Institute students must refrain from sexual harassment and follow the policies set forth for the Aquarius Institute students. Students should read the details on sexual harassment found in this program catalog.

If any individual feels sexually harassed based on any of the above conditions by an Aquarius Institute student, that individual may file a complaint with the director of Aquarius Institute. The director of Aquarius Institute is Jameel Ahmed; he can be reached at (847) 296-8870. If any individual needs to file a complaint, the individual can do so by contacting the director of Aquarius Institute or by writing to Aquarius Institute at 1011 East Touhy Avenue, Suite 335, Des Plaines, IL 60018.

## **Aquarius Institute Substance Abuse Policy**

Aquarius Institute is dedicated to providing an environment free of the illegal and/or abusive use of alcohol and/or drugs.

Aquarius Institute prohibits the use, possession, disbursement or reasonable suspicion of being under the influence of alcohol, inhalants, or any illegal drugs whether attending school or working as an intern at any of our affiliate sites.

Any student involved with substance abuse will be subject to dismissal and no refunds will be issued. Illegal activities will be reported to the police.

## **MAGNETIC RESONANCE IMAGING (MRI) TECHNOLOGIST**

**CIP Code 51-0920**

**Description:** This is a one year Magnetic Resonance Imaging (MRI) Technologist Training Program which also includes 1000 hours of mandatory MRI Clinical Internship (classroom and clinical internship combined may take in excess of 24 months to complete). This program is developed to prepare students to operate MRI Equipment safely and competently to produce diagnostically acceptable images. Having completed this program the student will have sufficient knowledge and skills to work in an MRI center or Hospital's MRI Dept. as an MRI technologist. This program provides sufficient theory and practical knowledge so as to enable the students to challenge the National Certification Examination in MRI modality. Upon successful completion of both Didactic and Clinical parts of the Program, the School will award a Certificate of Completion from the School. The refund policy will be based on the 600 hours of coursework. It will be the responsibility of the School to provide Clinical Internship opportunities to the MRI students at MRI Clinics or MRI Department in Hospitals. The school reserves the right to assign the student to any available Clinical Site. Clinical Internship sites are located according to affiliations and relationships formed between Aquarius Institute and community and Chicagoland companies/organizations/facilities. And the clinical internship sites may be in excess of a 30 mile radius of Aquarius Institute's Des Plaines' campus.

**PROGRAM OBJECTIVES:** This course has been designed to meet the growing demand of Magnetic Resonance Imaging (MRI) Technologists in the field of Diagnostic Medicine. According to present job market analysis a large number of qualified individuals are required in the Medical Technologist field. The objectives of this course are to provide efficient and well trained MRI Technologist to satisfy the present day job market needs.

### **Vocational Objectives:**

This program has been designed to meet the growing demand of Magnetic Resonance Imaging (MRI) Technologists in the field of Diagnostic Medicine. According to the present job market analysis, a large number of qualified individuals are required in the Medical Technologist field. The objectives of this program are to provide efficient and well trained MRI Technologist to satisfy the present day job market needs.

### **Program Learning Outcomes**

Below are the learning outcomes that the MRI student must master in keeping with the program's mission and goals. These outcomes serve to guide the student toward fulfilling the program goals. They form the basis for measuring what the student has accomplished upon completion of the program. Upon completion of this Program, the graduate will be able to:

- To provide compassionate and responsible patient care during diagnostic procedures
- Use oral and written communication with patients, peers, and medical staff
- Produce diagnostic MRI Images safely and competently in the context of all MRI procedures
- Utilize critical thinking, problem solving, and decision-making skills in performing medical imaging procedures
- Successfully pass the completion examination given by the School and certification examination given by the MRI National Registry
- Possess the clinical skills necessary for professional practice as an entry-level MRI Technologist

**Length of Program:** One year of course work and 1000 hours of clinical internship (classroom and clinical internship combined may take in excess of 24 months to complete).

### **Program Outline:**

<b><u>Course Title</u></b>	<b><u>Lecture Clock Hours</u></b>
I. Anatomy and Physiology	85
II. Medical Terminology	40
III. Patient Management	10
IV. MRI Safety	132
V. MRI Physics	110
VI. Cross-sectional Anatomy	231
VII. MRI Clinical Internship	1000
Held at Affiliated MRI Clinical Sites	

**Total Lecture Clock Hours: 608**

### **Corsmed MRI Simulation Software:**

The Aquarius Institute provides its students with a free one-year access license to Corsmed MRI simulation software. This software is integrated into our MRI course such as: MRI physics, MRI safety, and MRI Cross Sectional Anatomy. The software allows for interactive modular training which enhances understanding of real world application of content covered in courses listed above. The Aquarius Institute is the only institution that incorporates MRI software simulation in its MRI coursework apart from guaranteed MRI clinical internships. Here is the description MRI Simulator:

This simulator was developed in Sweden and is accessible on the web 24/7. This simulator has the onboarding program for the students. Using this simulator, for our students as if they had their own MRI counsel in their own home, they can use it any place on their laptop or computer. They can plan scans, manipulate parameters, and produce T1 and T2 curves. They can learn Inversion recovery, Gradient echo, and Spin Echo etc.... They can also simulate artefacts and learn how to correct or diminish them and can scan any part of the body including cardiac imaging. This simulator is used in some of the most well-known universities in Europe, in the United States. It also has unlimited practices online.

The Corsmed complete simulator also has 24/7 assistance online for our students. The developers of this simulator also offer Zoom meetings to further assist our students or instructors when there is a need. Aquarius Institute instructors are available for trouble shooting to guide our students also. We are utilizing the simulator to teach our students and work closely with them, for them to learn and develop their skills. Even before they go to their clinical sites, they are able to distinguish between T1, T2, Spin Echo or Gradient Echo image, by looking on the parameters and the image waiting.

Corsmed will also extend a certificate to our students, when they complete a certain number of hours and assignments where they produce not only sequences on their own, but also are able to scan a complete protocol. For example, brain with and without contrast.

The student will be responsible for selecting the correct sequences, planes, input the parameters like TR, TE, Phase and frequency direction, slice thickness, BW, flip angles, number of slices .... etc. this is more than any of our students will do on their clinical sites.

**TUITION & FEES:**

Registration Fee	\$ 150
Text Books	\$500
Tuition Fee	\$ 21,000
MRI Simulation	Free
<b>Total Program Cost</b>	<b>\$ 21,650</b>

***Installment Payment Plan Option:***

No interest is charged for using the installment method of payment.

**Note:** A late fee of \$35 applies to all installment payments not paid on schedule; see installment plan sheet for details

**OTHER ESTIMATED COSTS:**

Uniforms	\$50.00
Hepatitis Vaccine	\$100.00
Tuberculosis Test OR Chest X-ray	\$150.00
CPR Healthcare Provider Certification	\$75.00
Liability Insurance	\$42.00
<b>Total Other Estimated Costs</b>	<b>\$417</b>

**Notes:**

1. You need to go to the HPSO web site to obtain the **liability insurance**. The cost is \$42 for a 12-month policy. <http://www.hpsso.com/professional-liability-insurance/student-coverage-description.jsp>.
2. Personal Healthcare cost will vary according to individual's situation.
3. CPR courses are available twice a year at Aquarius. The alternate is for the potential student to go to CPR Associates in Chicago at Address: 2616 W Peterson Ave, Chicago, IL 60659, Phone: (773) 973-6933 or where ever the student wants to choose to obtain an AHA Healthcare Providers Certification card.
4. **Note to Foreign Students:** you may need to add an estimated cost of \$195 for education evaluation of diplomas and/or transcripts.

**Admission Requirements:****General Requirements:**

- Minimum 18 years of age
- Proof of graduation from a U.S. High School or equivalent as determined by appropriate accrediting agencies
- Responsible to notify the Aquarius administrator prior to enrollment, if student has a need for any instructional accommodations and/or any special learning needs
- Graduates from foreign schools require local evaluation (see note below)
- Official High School Transcript and have a **Grade Point Average (GPA) of 2.5** or above
- Provide a current resume if applicable
- Must possess knowledge of computers; must be able to use word processing programs
- Complete a personal interview with the Job Developer

**Note:** Foreign students may use Educational Credential Evaluators, Inc. (ECE) or any other U.S. equivalent agency. Contact Educational Credential Evaluators, Inc. (ECE) at <https://www.ece.org/> or ECE 101 W. Pleasant St. Suite 200 Milwaukee WI 53212-3963 Telephone number: 414-289-3400 available Monday through Friday, 9:00 a.m. to 4:00 p.m. CST. Educational Credential Evaluators, Inc. (ECE) evaluates a foreign diploma and transcript from an English translation only. Estimated cost \$195.

### **Health Requirements**

- Students must submit obtain or have proof of a Hepatitis B vaccination, at the student's expense, 30 days prior to starting clinical internship (following acceptance into the program).
  - Must submit a doctor's note or titer result as proof or card for having Hepatitis B immunization.
  - Or have a signed refusal form in student's record
- Students must obtain malpractice insurance at the student's expense (following acceptance into the program)
- Students must have visual acuity, hearing acuity, speaking ability, digital dexterity and physical ability to perform the required assessment, procedures and related preparation and testing issues
- Students should have a reliable means of transportation
- Students must possess a valid CPR card prior to starting clinical internship
- If the potential student does not have a Tuberculosis (PPD) test then the student must obtain a 2 step Tuberculosis test (PPD), at the student's expense, before start of the clinical internship
- Students must submit a PPD result or if the previous PPD was positive the student must submit a chest x-ray as proof that student is clear from TB disease

### **Aquarius Institute is not accredited:**

Aquarius Institute is not accredited by a U.S. Department of Education recognized accrediting body.

### **Aquarius Institute does not have any articulation Agreements:**

Aquarius Institute does not have any articulation agreement with any college, organization, or facility.

**Therefore the certificate or courses are not transferable to any other College, University or Institute. Please consult with any institute of higher learning you are applying to for their transfer requirements.**

**Credentials Received:** Upon completion of the program (classroom and clinical internship) the student will receive a Certificate of Completion and Official Transcript from Aquarius Institute. Completion of the entire program is the prerequisite to take the National Registry/Licensing Exam provided by ARMTRIT.

**Program Instructor License Requirements:** Instructors teaching the field specialty part of the program must be Registered/ Licensed/Certified per industry requirements.

### **Job Prospect:**

MRI is becoming a widely accepted diagnostic procedure and there is a growing demand for qualified, well trained and efficient MRI Technologists.

### **Text Books:**

Note: Editions will change as the author(s) update the book(s)



**1. Medical Terminology: A Living Language 6e**

Author: Bonnie F. Fremgen, Suzanne S. Frucht  
Publisher: Pearson Prentice Hall; Published – 2016  
ISBN: 978-0-13-407025-4

**2. Visual Anatomy & Physiology, Plus Mastering A&P, 2<sup>nd</sup> Ed.**

Authors: Frederic H. Martini, William C. Ober, Judi L. Nath, Edwin F. Bartholomew, and Kevin Petti  
Publisher: Pearson; Published: 2015  
ISBN-10: 0321918746

**3. MRI in Practice, 5<sup>th</sup> Edition**

Authors: Catherine Westbrook, Carolyn Kaut Roth & John Talbot  
Publisher: Wiley - Blackwell Publishing; published - 2011  
ISBN: 978 1444337433

**4. Handbook of MRI Technique, 4<sup>th</sup> Ed.**

Authors: Catherine Westbrook  
Publisher: John Wiley and Sons, Ltd; Published - 2014  
ISBN: 978-1-118-66162-8

**5. Sectional Anatomy for Imaging Professionals**

Authors: Lorrie L. Kelley, Connie M. Peterson  
Publisher: Elsevier; published - 2013  
ISBN: 978 0323082600  
(Book Selection May Change Based On Availability and Instructor Recommendations)

**Reference Books & Audio/Video Aid (These are optional and not included in program)**

1. Introduction to Functional Magnetic Resonance Imaging: Principles and Techniques  
Author: Richard B. Buxton  
ISBN: 0521581133

2. MRI for Technologists  
Author: Peggy Woodward  
ISBN: 0071353186

3. Cardiovascular MRI and MRA  
Authors: Charles B., MD Higgins, Albert De Roos, Helen J. Streubert  
ISBN: 0781734827

4. Handbook of MRI Technique  
Author: Catherine Westbrook  
ISBN: 0632038845

5. MRI Parameters and Positioning  
Authors: Torsten B., Md Moeller, Emil R. Reif  
ISBN: 1588901491

6. Magnetic Resonance Imaging: Mathematical Foundations and Applications

Author: Walter Johannes Schempp

ISBN: 0471167363

7. Abdominal-Pelvic MRI

Author: Richard C. Semelka

ISBN: 047141476X

8. An Introduction to Functional Magnetic Resonance Imaging: Principles and Techniques

Author: Richard B. Buxton

ISBN: 0521581133

9. Atlas of Human Cross-Sectional Anatomy: With CT and MR Images

Author: Donald R. Cahill, Mayo Medical School, Rochester

ISBN: 0471591653

10. Cranial and Spinal MRI and CT

Authors: Seungho Howard Lee, Robert A. Zimmerman, Krishna C. Rao

ISBN: 0070376891

11. Foundations of Medical Imaging

Author: Z. H. Cho

ISBN: 0471545732

12. Interventional MRI

Author: Robert B. Lufkin

ISBN: 0815145454

13. MRI and CT of the Brain

Authors: James E. Gillespie, Alan Jackson

ISBN: 0340761210

14. MRI of the Head and Neck

Author: Robert B. Lufkin

ISBN: 0781725720

15. MRI of the Musculoskeletal System

Authors: Karence K. Chan, Mini Pathria

ISBN: 0781725712

16. The Language of Medicine; 10<sup>th</sup> Ed.

Author: Davi-Ellen Chabner

ISBN: 978-1-4557-2846-6

17. Understanding Anatomy and Physiology: A Visual, auditory. Interactive Approach

Author: Gale Sloan Thompson

Publisher: FA Davies Company

ISBN: 0803622876

18. Understanding Anatomy and Physiology WORKBOOK: A Visual, auditory. Interactive Approach

Author: Gale Sloan Thompson

Publisher: FA Davies Company

ISBN: 978 0803622883

**MRI Journals for Reference Purpose:**

- Applied Magnetic Resonance
- Concepts in Magnetic Resonance
- Diagnostic Imaging
- Free Full-Text Journals in Chemistry
- Imaging Decisions
- Journal of Magnetic Resonance
- Journal of Magnetic Resonance Imaging
- Magnetic Resonance Materials in Physics, Biology and Medicine (MAGMA)
- Magnetic Resonance in Medicine
- Topics in Magnetic Resonance Imaging

**Reference Audio Video Material:**

The School will establish a library of MRI related Audio and Video training programs to supplement the classroom training.

## **DETAILED COURSE OUTLINE**

### **Course I: Medical Terminology**

#### **Lecture hours: 40**

Each system will relate real-world applications and reviews

#### **Introduction to Medical Terminology**

Medical terminology at a glance; Building medical terms from word parts; Word roots (combining vowel/forms); Prefixes and Suffixes; Word building; Interpreting Medical Terms; Abbreviations which are given for each system; The Medical Record; Healthcare settings; Confidentiality

#### **Body Organization**

Body organization at a glance and illustrated; Levels of Body organization; Cells; Tissues; Organs and body systems; Body planes, regions, and body cavities; Directional and positional terms; Anatomical terms and abbreviations

#### **Integumentary System**

System at a glance and illustrated; Anatomy and physiology; Terminology and Anatomical terms; Pathology; Pharmacology; Diagnostic and therapeutic procedures

#### **The Musculoskeletal System**

Skeletal System at a glance; System illustrated; Anatomy and Physiology; Bones; Skeleton; Appendicular Skeleton; Joints; Anatomical Terminology; Pathology; Words used to build system; Diagnostic and therapeutic procedures; Pharmacology; Abbreviations.

Muscular System at a glance; System illustrated; Anatomy and Physiology; Skeletal muscle actions; Terminology; Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology; and Abbreviations.

#### **The Cardiovascular System**

System at a glance and illustrated; Anatomy and physiology; The heart; The blood vessels; Terminology - words used to build system; Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

#### **Blood and Lymphatic and Immune Systems**

Systems illustrated; Anatomy and physiology of blood; Plasma and Platelets; Erythrocytes and leukocytes; Blood Typing; Anatomy and physiology for Lymphatic and Immune systems; Lymphatic vessels and Lymph nodes; Tonsils, spleen, and Thymus gland; Immunity; Terminology – words used to build systems; Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

#### **The Respiratory System**

System at a glance and illustrated; Anatomy and physiology: Nasal cavity, Pharynx, Larynx, Trachea; Bronchial tubes, lungs, lung volumes and capacities; Respiratory muscles and rate; Terminology - words used to build system; Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

#### **Digestive System**

System at a glance and illustrated; Anatomy and physiology; Terminology and Anatomical terms; Pathology Diagnostic and therapeutic procedures; Pharmacology; Abbreviations

## **Urinary System**

System at a glance and illustrated; Anatomy and Physiology; Role of Kidneys in Homeostasis: Stages of Urine production; Terminology and Anatomical terms, Pathology; Diagnostic and therapeutic procedures; Pharmacology

## **Reproductive System**

**Female** System at a glance and illustrated; Anatomy and physiology: Internal genitalia; Vulva; Breast; Pregnancy; Labor and Delivery; Terminology and Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

**Male** System at a glance and illustrated; Anatomy and physiology: External organs of reproduction; Internal organs of reproduction; Terminology and Anatomical terms; Pathology, Pharmacology; Diagnostic and therapeutic procedures; Abbreviations

## **Endocrine System**

System at a glance and illustrated; Anatomy and physiology: Adrenal glands, Ovaries, Pancreas, Parathyroid glands, Pineal gland, Pituitary gland, Testes, Thymus gland, Thyroid gland; Terminology and Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

## **Nervous System**

System at a glance and illustrated; Anatomy and physiology; Nervous tissue; Central nervous system; Peripheral nervous system; Terminology and Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

## **Special Senses: the Eye and Ear**

The eye illustrated; Anatomy and physiology: the eyeball, Muscles of the eye, the eyelids, Conjunctiva, Lacrimal apparatus; How we see: Terminology and Anatomical terms, Pathology; Diagnostic and therapeutic procedures; Pharmacology;

The ear illustrated; Anatomy and physiology: External ear, Middle ear, Inner ear; How we hear: Terminology and Anatomical terms; Pathology; Diagnostic and therapeutic procedures; Pharmacology

## **Special Topics**

**Pharmacology:** Drug names and classifications; How to read a prescription; Routes and methods of drug administration; Pharmacological terms

**Mental Health:** Disciplines; Psychology; Psychiatry; Pathology; Therapeutic Procedures

**Diagnostic Imaging:** Imaging, terms and procedures

**Rehabilitation Services:** Physical Therapy; Occupational Therapy; Terms; Procedures

**Surgery:** Anesthesia; Instruments; Surgical positions

**Oncology:** Oncology and staging tumors

Pathology Terms; Diagnostic and therapeutic procedures; Abbreviations

## **Course II: Anatomy and Physiology**

**Lecture hours: 85**

### **Body Systems**

Introduction

### **Chemical Level of Organization**

Atoms and molecules; types of cells; Chemical reactions; The importance of water in the body; Organic compounds

### **Cellular Level of Organization**

An introduction to cells; Structure and function of the nucleus; How things enter and leave the cell; Cell life cycle

### **Tissue Level of Organization**

Epithelial tissues; Connective tissue; Muscle and neural tissue

### **Integumentary System**

Functional anatomy of the skin; Accessory Organs of the skin

### **The Skeletal System**

**Osseous tissue and bone structure:** Introduction to the bones of the skeleton system; The physiology of bones

**The Skeleton:** Axial skeleton; appendicular skeleton

**Joints:** Joint structure and movement; Axial and appendicular joints

### **The Muscular System**

Skeletal Muscle Tissue; the muscular system

### **The Nervous System**

Neurons and neuroglia; Neurophysiology

### **The spinal cord, spinal nerves, and spinal reflexes**

The functional organization of the spine Cord; An introduction to reflexes

### **The Brain and Cranial nerves**

Functional anatomy of the brain and cranial nerves; Sensory and motor pathways

### **The Autonomic Nervous System**

Functional anatomy and organization of the autonomic nervous system; Autonomic regulation and control mechanisms

### **The Special Senses**

An introduction to the special senses: olfaction and gustation; Equilibrium and hearing; Vision

### **The Endocrine System**

Hormones and intercellular communication; Hormones and system integration

### **Cardiovascular System**

**Blood;** Characteristics of Blood; Functional anatomy of blood vessels

### **The Heart and Cardiovascular Function**

The structure of the heart; Cardiac cycle; Coordination of cardiac output and peripheral blood flow

### **The Lymphatic System**

Anatomy of the Lymph system and immunity; Nonspecific defenses; Specific defenses

### **The Respiratory System**

Functional anatomy of the respiratory system; Respiratory physiology

### **The Digestive System**

General organization of the digestive system; The digestive tract; Accessory digestive organs  
Metabolism and Energetics: An introduction to cellular metabolism; Digestion and metabolism of organic nutrients; Energetics and thermoregulation

### **The Urinary System**

Anatomy of the urinary system; Overview of renal physiology; Urine storages and elimination

### **Fluid, electrolyte, and acid-base balance**

Fluid and electrolyte balance; Acid-base balance

### **The Reproductive System**

Male and Female reproductive systems

**Development and Inheritance:** An overview of Human development; Genetics and inheritance

## **Course III: Patient Management**

### **Lecture hours: 10**

#### **Unit I: The Profession of Radiologic Technology**

Professional Organizations; Critical Thinking and Problem Solving Strategies

#### **Unit II: Introduction to the Clinical Environment**

Introduction to Clinical Education; Radiology Administration; Human Diversity

#### **Unit III: Patient Care**

Patient Interactions; History Taking; Safe Patient Movement and Handling Techniques; Vital Signs, Oxygen, Chest Tubes, and Lines; Infection Control; Aseptic Techniques; Non-aseptic Techniques; Medical Emergencies; Pharmacology

#### **Unit IV: Ethical and Legal Issues**

Professional Ethics; Health Records and Health Information Management; Medical Law

## **Course IV: MRI Safety**

**Lecture hours: 132**

### **Screening of Patients**

Ancillary Equipment; Personnel; Biomedical Implants (e.g., pumps, aneurysm clips, pacemakers, etc.)

### **Assessment & Monitoring**

Sedated Patients; Adverse Reactions to Contrast 3. Potential Biological Effects; Life-Threatening Situations; Cryogen safety; Projectiles

### **Safety Precautions**

Placement of Electrical Conductors(e.g., ECG leads, coils, cables); Environmental Considerations Temperature; Humidity; Gauss lines; Magnetic shielding; RF shielding; Posting of warning signs; Emergency Procedures; Equipment (e.g., quench, fire, etc.); Patient (e.g., Cardiac,Respiratory, etc.); Education (e.g., patients, visitors and hospital personnel)

### **Biological Considerations**

Radio Frequency; FDA Guidelines; Specific Absorption Rate; Potential Biological Effects; Static Field Strength; FDA Guidelines; Potential Biological Effects; Gradient Field; FDA Guidelines; Time-Varying Magnetic Fields; Potential Biological Effects

### **Cause & Appearance of Artifacts**

Aliasing; Gibbs, truncation; Chemical shift; Magnetic susceptibility; Radiofrequency; Motion & flow; Partial volume averaging; Crosstalk

### **TEXTBOOK(S)**

Essentials of MRI Safety by Donald W. McRobbie By Wiley Blackwell

### **COURSE DESCRIPTION**

This course will prepare the student to recognize the safety elements of the MR hardware, fields, forces, bio-effects and

acoustic noise. Safety in pregnancy and contrast agents. Passive implants as well as active implants as well as the understanding of the conditions of devices, what can be scanned and what is necessary to meet each device's conditions to

safely scan patients with active and passive devices. The student will be able to identify the implants and safety of each device.

### **LEARNING OBJECTIVES**

1. Understand risk factors in MRI
2. Understanding of the different fields (Static, time-varying gradient, radio-frequency)
3. Learn to look up and identify devices and their conditions, if they are active or passive devices
4. Understand occupational exposure
5. Understand safety in pregnancy
6. Understanding the risk with acoustic noise

Upon the successful completion of this course, the student will be able to:

- ☐ Understand roles in MR safety
- ☐ Understand checklist and patient screening
- ☐ Understand MR hardware



- ☐ Understand different fields in MR
- ☐ Understand Passive Devices Vs. Active Devices
- ☐ Understand law of induction
- ☐ Understand acute sensory effects and cognitive effects when exposed to MR fields
- ☐ Understand nerve stimulation
- ☐ Understand RF exposure limits
- ☐ Understand the importance of wearing hearing protection during an MRI
- ☐ Understand MRI conditions of conditional devices
- ☐ Specific Absorption Rate (SAR) limits
- ☐ Know what to do when you do not know the conditions of a implant or device
- ☐ Know your limitation

## **COURSE INSTRUCTIONAL METHODS**

1. Lectures
2. Class assignments

## **COURSE EXPECTATIONS**

### **Attendance**

Students are expected to attend class meetings. 3 absences are allowed per trimester. If you miss more, it results in a 10% drop in your overall grade.

### **Discussion Questions/Participation**

This course uses Discussion Questions as a means for participation in a classroom setting or by Zoom. Topics are given out on a weekly basis to students. Each student is expected to participate with questions and responses during the class.

### **Assignments**

The assignments cover the key concepts from the course and relate directly to the course learning objectives. The textbook assignments are reviewed and prepare the students for a quiz on that material. Late assignments will be accepted (up to one week late) with a 10% penalty.

### **Quizzes**

There are ten quizzes given during this course. The quizzes start in Week 2. Each quiz will be 20 minutes long. Late quizzes will be accepted (up to one week late) with a 10% penalty.

### **Exams**

The Midterm will be given in Week #6. The Midterm Exam covers material taught during Weeks 1- 5.

The Final Exam is a comprehensive exam with questions from “Essentials of MRI Safety”, and any material reviewed in the Discussions, Assignments, Quizzes, and the Midterm Exam.

Late exams will not be accepted without prior approval from the instructor. Midterm and Final exams require students to take the exams in person. Students must show a valid picture identification.

### **Posting of Grades**

Grades for assignments and discussions will be posted by the end of the week following the week they were due. For the quizzes, they are given using Google classroom, the student can know his/her grade immediately after they take the quiz. For the Mid-Term and Final Exams, grades are provided the following week after the exams.

## **COURSE REQUIREMENTS AND GRADING SCALE**

### **Course Requirements**

Attendance/Participation	10%	100 Points
Assignments	20%	
<input type="checkbox"/> Paper Assignments	10%	100 Points
<input type="checkbox"/> Scanning Assignments	10%	100 Points
Quizzes	15%	150 Points
Midterm Exam	20%	200 Points
Final Exam	35%	350 Points
Total Points	100%	1000 Points

### **Grading Scale**

90-100	A
80-89	B
70-79	C
60-69	D
59 or less	F

## **Course V: MRI Physics**

**Lecture hours: 110**

### **Basic principles**

Introduction; atomic structure; motion in the atom; MR active nuclei; the hydrogen nucleus; alignment; precession; the Larmor equation; Resonance; the MR signal; the free induction decay signal (FID); relaxation, t1 recovery; T2 decay; pulse timing parameters

### **Image weighting and contrast**

Introduction; image contrast; contrast mechanisms; relaxation in different tissues; T1 contrast; T2 contrast; proton density contrast; Weighting T2\* decay; introduction to pulse sequences

### **Encoding and image formation**

Encoding; introduction; gradients; slice selection; frequency encoding; phase encoding; sampling; data collection and image formation: introduction; K space description; K space filling; fast fourier transform (FFT); important facts about K space; K space traversal and gradient; options that fill K space; types of acquisition

### **Parameters and trade-offs**

Introduction; signal to noise ratio (SNR); contrast to noise ratio (CNR); spatial resolution; scan time; trade-offs; decision making; volume imaging

### **Pulse sequences**

Introduction; spin echo pulse sequences; conventional spin echo; fast or turbo spin echo; inversion recovery; fast inversion recovery; STIR (short tau inversion recovery); FLAIR (fluid attenuated inversion recovery); IR

prep sequences; gradient echo pulse sequences: conventional gradient echo; the steady state and echo formation; coherent gradient echo; incoherent gradient echo (spoiled); steady state free precession (SSFP); balanced gradient echo; fast gradient echo; parallel imaging techniques

### **Flow phenomena**

Introduction; the mechanism of flow; flow phenomena; time of flight phenomenon; entry slice phenomenon; intra-voxel dephasing; flow phenomena compensation: introduction; even echo rephrasing; gradient moment rephrasing (nulling); spatial pre-saturation

### **Artefacts and their compensation**

Introduction; phase mismapping; aliasing or wrap around; chemical shift artefact; out of phase artefact (chemical misregistration); magnetic susceptibility artefact; cross-excitation and cross-talk; sipper artefact; shading artefact; Moiré artefact; magic angle

### **Vascular and cardiac imaging**

Introduction; conventional MRI vascular imaging techniques; magnetic resonance angiography (MRA); cardiac MRI; cardiac gating; peripheral gating; pseudo-gating; multiphase cardiac imaging; Ciné; SPAMM

### **Instrumentation and equipment**

Introduction; magnetism; permanent magnets; electromagnets; Superconducting electromagnets; fringe fields; Shum coils; gradient coils; radio frequency (RF); patient transportation system; MR computer systems and the user interface

### **MRI safety**

Introduction; government guidelines; safety terminology; hardware and magnetic field considerations; radio frequency fields; gradient magnetic fields; the main magnetic field; projectiles; siting considerations; MRI facility zones; safety education; protecting the general public from the fringe fields; implants and prostheses; devices and monitors in MRI; pacemakers; patient considerations; safety policy; safety tips; reference

### **Contrast agents in MRI**

Introduction; mechanism of action of contrast agents; molecular tumbling; dipole-dipole interactions; magnetic susceptibility; relativity; gadolinium safety; other contrast agents; current applications of gadolinium contrast agents; conclusion

### **Functional imaging techniques**

Introduction; diffusion weighted imaging (DWI); perfusion imaging; susceptibility weighting (SWI); functional imaging (fMRI); interventional MRI; MR spectroscopy; whole body imaging; MR microscopy MRM)

### **TEXTBOOK(S)**

Catherine Westbrook, John Talbot, MRI in Practice (5th ed.) (Paperback) Wiley-Blackwell.

### **COURSE DESCRIPTION**

Magnetic Resonance Imaging as a modality is still expanding and evolving rapidly and poses many challenges for the technologist and radiologist. An in-depth understanding of the technology and clinical practice are necessary to exploit the full potential of the MR system.

This course is designed to enable the student to maximize MR image quality by understanding the fundamentals as well as advance concepts and processes of MR imaging. Concepts of pulse sequencing, image parameters and artifact reduction techniques will be presented. Topics include Pulse Sequences, Contrast Media, Artifacts and

## LEARNING OBJECTIVES

Within this course the student will be introduced to:

- ☐ The physical principles of magnetic resonance imaging.
- ☐ This course will include the history of magnetic resonance imaging
- ☐ This course utilizes physics of electromagnetism, radiofrequency, gradient systems, nuclear magnetism, tissue characteristics, instrumentation, and clinical indications for utilization of MR imaging.

Upon the successful completion of this course, the student will be able to:

1. Discuss magnetism with reasonable comfort and ability to use the subject material.
2. Explain the mechanism by which MR signal is produced and detected.
3. Obtain basic knowledge of the fundamental principles and techniques utilized in MRI.
4. Explain MR tissues characteristics such as spin density, T 1 and T 2 relaxation.
5. Conceptualize and explain spatial localization and MR image formation.
6. Apply the principle of pulse sequences for appropriate clinical application.
7. Describe and apply the imaging parameters & options available to the user for optimal MR imaging.
8. Describe relaxation time, T 2 \*, pulse sequence used to emphasize T 2 \* contrast, T 1 measures, T 2 measures, and T 2 \* measures.
9. Compare and contrast T 1 , T 2 and T 2 \* and give examples of operator selected parameters such as:
  - ☐ repetition time (TR)
  - ☐ Echo time (TE)
10. Explain free induction decay (FID), compare, spin-lattice (T 1 ) relaxation, spin-spin (T 2 ) relaxation and relative proton density (RPD) as to their definition.
11. Explain the relaxation times for small molecules vs. large molecules.
12. Describe the relationship between T 1 and T 2 in the imaging of solids and liquids.
13. Explain the effect of TR and TE parameters on the image gray scale.
14. Discuss the advantages and disadvantages of varying the TR and TE on the resultant image and on the total scan time.
15. Describe the effects of flip angle, TR and TE on gradient echo imaging and the advantage of obtaining images at several TR and TE settings when studying a pathological condition.
16. Discuss the effect of a very long TR time on the T 1 information of the image.
17. Identify the tissue parameters that affect tissue contrast.
18. Describe partial saturation. Spin echo pulse sequence, inversion recovery pulse sequence.
19. Describe the use and limitations of the spin echo and inversion recovery pulse sequences
20. Describe phase and frequency encoding.
21. Gradient echo pulse sequence, fast spin echo pulse sequence.
22. Describe the use and limitations of gradient echo and fast spin echo sequences.
23. Compare and contrast spin echo and gradient echo imaging techniques
24. Describe the echo planar pulse sequence, use and limitations.
25. Explain the effects of field strength on T1 and differentiate between inversion time (TI), TE and TR.
26. Discuss the change in relaxation times caused by body composition and pathological conditions.
27. Describe the effect of temperature and poorly hydrated tissue when imaging under MRI.

28. Discuss contrast to noise ratio (CNR), signal to noise ratio (SNR).
29. Factors and parameters that affect scan time.
30. Explain the shortening of T 1 when using contrast agents, such as gadolinium.
31. Discuss what tissues in the body normally take up gadolinium and why.
32. Compare (STIR) Short Time Inversion Recovery and (FLAIR) sequences.
33. Discuss gradient moment nulling and spatial presaturation techniques.
34. Define the cause and discuss the correction for the following artifacts: RF leak, aliasing, patient motion, Gibbs, truncation, chemical shift, magnetic susceptibility and flow motion.
35. Compare and contrast the basic components of magnetic resonance to other modalities.
36. Identify at least three advantages of using MR in making a diagnosis as compared to other modalities such as computed tomography, ultrasound, nuclear medicine, etc.
37. Explain the basic rationale for electing to use MR over other modalities for assisting with the diagnosis of various pathologies.
38. Describe the principle of electro cardiac gating and draw and label an electrocardiogram (ECG) trace with the trigger window, trigger delay and respiratory rate (RR) interval.
39. Explain how blood flow produces alterations in image contrast.
40. Describe the differences in precessional frequencies of fat, water and silicone.
41. Diagram pulse sequences to identify readout, phase and frequency components.
42. Describe the components of the MR system hardware.

## **COURSE INSTRUCTIONAL METHODS**

1. Lectures
2. Class assignments
3. Demonstration and practices utilizing the Corsmed simulator

## **COURSE EXPECTATIONS**

### **Attendance**

Students are expected to attend class meetings. 3 absences are allowed per trimester. If you miss more, it results in a 10% drop in your overall grade.

### **Discussion Questions/Participation**

This course uses Discussion Questions as a means for participation in a classroom setting or zoom. Topics are given out on a weekly basis to students. Each student is expected to participate with questions and responses during the class and to complete Corsmed simulator assignments weekly.

### **Assignments**

The assignments cover the key concepts from the course and relate directly to the course learning objectives. The textbook assignments are reviewed and prepare the students for a quiz on that material. Late assignments will be accepted (up to one week late) with a 10% grade penalty.

### **Quizzes**

There are ten quizzes given during this course. The quizzes start in Week 2. Each quiz will be 20 minutes long. Late quizzes will be accepted (up to one week late) with a 10% penalty.

### **Exams**

The Midterm will be given in Week #5. The Midterm Exam covers material taught during Weeks 1- 4.

The Final Exam is a comprehensive exam with questions from “MRI in Practice”, and any material reviewed in the Discussions, Assignments, Quizzes, and the Midterm Exam.

Late exams will not be accepted without prior approval from the instructor. Midterm and Final exams require

students to take the exams in person. Students must show a valid picture identification.

### Posting of Grades

Grades for assignments and discussions will be posted by the end of the week following the week they were due. For the quizzes, which are given using Google classroom, the student can know his/her grade immediately after they take the quiz. For the Mid-Term and Final Exams, grades are provided the following week after the exams.

## COURSE REQUIREMENTS AND GRADING SCALE

### Course Requirements

Attendance/Participation	10%	100 Points
Assignments	20%	
<input type="checkbox"/> Paper Assignments	10%	100 Points
<input type="checkbox"/> Scanning Assignments	10%	100 Points
Quizzes	15%	150 Points
Midterm Exam	20%	200 Points
Final Exam	35%	350 Points
Total Points	100%	1000 Points

### Grading Scale

90-100	A
80-89	B
70-79	C
60-69	D

## Course VI: Cross-Sectional Anatomy

### Lecture hours: 231

#### Introduction to sectional anatomy

#### Cranium and facial bones

Cranium; facial bones; temporomandibular joint; paranasal sinuses; orbit

#### Brain

Meninges; ventricular system; cerebrum; diencephalon; limbic system; brainstem; cerebellum; cerebral vascular system; cranial nerves

#### Spine

Vertebral column; ligaments; muscles; spinal cord; plexuses; vasculature

#### Neck

Organs, muscles, vascular structures

#### Thorax

Bony thorax; pleural cavities; lungs; bronchi; mediastinum; lymphatic system; heart and vasculature; great vessels; coronary circulation; off-axis cardiac imaging; azygos venous system; muscles; breast; axilla

**Abdomen**

Abdominal cavity; Liver; gallbladder and biliary system; pancreas; spleen; adrenal glands; urinary system; stomach; intestines; abdominal aorta and branches; inferior vena cava and tributaries; lymph nodes; muscles of the abdominal wall

**Pelvis**

Bony pelvis; muscles; viscera; vasculature; lymph nodes

**Upper Extremity**

Shoulder; elbow; wrist and hand; neurovascular

**Lower Extremity**

Hips; knee and lower leg; ankle and foot; neurovascular

**Spine**

Cervical, thoracic, and lumbar spine; whole spine imaging

**TEXTBOOK(S)**

Westbrook, C. (2008). Handbook of MRI Technique (5th ed.). by Catherine Westbrook. Published by Wiley-Blackwell.

Handbook of MRI Scanning by Geraldine Burghart and Carol Finn. Published by Elsevier Mosby.

**COURSE DESCRIPTION**

This course will provide the student with patient positioning and imaging techniques related to the brain, spine, soft tissues, structures of the neck, upper and lower extremities, the pelvic girdle, as well as the abdomen and its related organs, the pelvis and the specific protocols for male and female. This course outlines the criteria on the acquisition of high-quality images of each anatomical region and the understanding of what constitutes a high-quality image by using the Corsmed MRI Simulator Simulator.

**LEARNING OBJECTIVES**

1. Utilize critical thinking and skills and apply them to each patient.
2. Utilize the appropriate imaging techniques, parameters, and sequences, to obtain the best images possible for patients' condition.
3. Cover the anatomy appropriately by focusing on the area of interest.
4. Learn proper documentation.
5. Learn to obtain proper patient history, to utilize the best protocol for the patient's condition.
6. Common MRI examination indications and contraindications.

7. Selection of appropriate imaging coils, and knowledge on troubleshooting when the designated coils are not available.
8. Proper positioning of patients within the MR system.
9. Landmark and use of the three-plane localizer for initial scanning planning.
10. Describe the normal tissue characteristics and pathology.
11. Apply the specific considerations necessary when imaging infants, children and geriatric patients.
12. How to care for a patient with a head injury or spinal injury.
13. Select the appropriate immobilization techniques for various types of procedures and patient conditions.
14. Understand the role of the technologist in patient education and care.
15. Describe the patient's preparation for various studies.
16. Describe why and when contrast media would be used and the effect on the resultant images.
17. Educate and describe the procedure to the patient.

18. Discuss the elements of safety management to ensure the safe operation of the MRI System when scanning patients and when patients are present in the MR environment.

19. Study the MR imaging techniques for the brain:

- ☐ Temporal Lobe
- ☐ Internal Auditory Canals
- ☐ Pituitary Gland
- ☐ Orbits

1. Study the MR imaging techniques for the soft tissue of the neck:

- ☐ Parotid Gland
- ☐ Cervical Spine
- ☐ Thoracic Spine
- ☐ Lumbar Spine

1. Study the MR imaging techniques for the upper extremity:

- ☐ Shoulder
- ☐ Humerus
- ☐ Elbow
- ☐ Forearm
- ☐ Wrist
- ☐ Hand
- ☐ Finger



1. Study the MR imaging techniques for the lower extremity:

- ☐ Pelvis
- ☐ Hip
- ☐ Femur
- ☐ Knee
- ☐ Tibia/Fibula
- ☐ Ankle
- ☐ Foot

1. Study the MR imaging techniques for the abdomen:

- ☐ Liver
- ☐ Pancreas
- ☐ Biliary System
- ☐ Spleen
- ☐ Kidneys

1. Study the MR imaging techniques for the female and male pelvis:

- ☐ Uterus
- ☐ Ovaries
  
- ☐ Bladder
- ☐ Prostate

## **COURSE INSTRUCTIONAL METHODS**

1. Lectures
2. Class assignments
3. Demonstration and practices utilizing the Corsmed MRI Simulator

## **COURSE EXPECTATIONS**

### **Attendance**

Students are expected to attend class meetings. 3 absences are allowed per trimester. If you miss more, it results in a 10% drop in your overall grade.

### **Discussion Questions/Participation**

This course uses Discussion Questions as a means for participation in a classroom setting or zoom. Topics are given out on a weekly basis to students. Each student is expected to participate with questions and responses during the class and to complete Corsmed simulator assignments weekly.

## **Assignments**

The assignments cover the key concepts from the course and relate directly to the course learning objectives.

The textbook assignments are reviewed and prepare the students for a quiz on that material. Late assignments

will be accepted (up to one week late) with a 10% grade penalty.

## **Quizzes**

There are ten quizzes given during this course. The quizzes start in Week 2. Each quiz will be 20 minutes

long. Late quizzes will be accepted (up to one week late) with a 10% penalty.

## **Exams**

The Midterm will be given in Week #7. The Midterm Exam covers material taught during Weeks 1- 6.

The Final Exam is a comprehensive exam with questions from “Handbook of MRI Technique ”/ “Handbook of

MRI Scanning”, and any material reviewed in the Discussions, Assignments, Quizzes, and the Midterm

Exam.

Late exams will not be accepted without prior approval from the instructor. Midterm and Final exams require

students to take the exams in person. Students must show a valid picture identification.

## **Posting of Grades**

Grades for assignments and discussions will be posted by the end of the week following the week they were

due. For the quizzes, which are given using Google classroom, the student can know his/her grade

immediately after they take the quiz. For the Mid-Term and Final Exams, grades are provided the following

week after the exams.

## **COURSE REQUIREMENTS AND GRADING SCALE**

### **Course Requirements**

Attendance/Participation	10%	100 Points
Assignments	20%	
<input type="checkbox"/> Paper Assignments	10%	100 Points
<input type="checkbox"/> Scanning Assignments	10%	100 Points
Quizzes	15%	150 Points
Midterm Exam	20%	200 Points
Final Exam	35%	350 Points
Total Points	100%	1000 Points

### **Grading Scale**

90-100	A
80-89	B
70-79	C
60-69	D
59 or less	F

## **Course VII: MRI Clinical Internship and Quality Assurance      Hours: 1,000**

The last course in the MRI Technologist program is 1000 hours of mandatory MRI Clinical Internship at the School's affiliated Clinical Sites. The Aquarius Institute is committed to excel the excellence in the MRI Technologist Program. The Institute will implement, evaluate and monitor the Quality Assurance both in the didactic and clinical training aspects of the program. Clinical studies will be performed under the supervision of the Qualified MRI Technologist and will be supervised by the School's assigned Clinical Supervisor. Students' entry and exit times will be recorded and signed by a designated clinical staff member. Students' will be provided with the procedure recording sheets to be used to record each procedure either observed, assisted or performed by a student. After the completion and attestation by the Clinical Supervisor, a copy of completed Procedure Recording Form will be submitted to the School official for record purpose.

Students are required to strictly follow the Policies and Procedure listed in the MRI Clinical Training Handbook. Clinical Supervisor and MRI Program Director will strictly monitor the clinical participation of the students to maintain and enhance the excellence in MRI Clinical Internship Program.

### **ARMRIT Accredited School:**

Aquarius Institute was approved by ARMRT since the 2004 calendar year. The MRI Technologist program instructed at the Aquarius Institute fulfills the ARMRT requirements to take the ARMRT Registry Certification Exam. After successfully completing the MRI Technologist program, Aquarius Institute students will be awarded with a certificate of completion and an official transcript. Students then need to submit their application for the ARMRT exam along with their Aquarius Institute credentials to become eligible for the ARMRT exam, Aquarius Institute is accredited by ARMRT, **however ARMRT is not accredited by a U.S. Department of Education recognized accrediting body.**

**Effective November 12, 2014:**

Aquarius Institute has received Full Accreditation of the MRI Program from ARMIRIT. Effective dates are as of November 12, 2014 and good through November 2024.

**Aquarius Institute is not accredited:**

Aquarius Institute is not accredited by a U.S. Department of Education recognized accrediting body.

**Aquarius Institute does not have any articulation Agreements:**

Aquarius Institute does not have any articulation agreement with any college, organization, or facility.

**Therefore the certificate or courses are not transferable to any other College, University or Institute. Please consult with any institute of higher learning you are applying to for their transfer requirements.**

**Addendum:** Institutional Disclosures Reporting Table

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**Institutional Disclosures Reporting Table**  
**Reporting Period: July 1, 2021 – June 30, 2022**

INSTITUTION NAME: Aquarius Institute	Indicate all ways the disclosure information is distributed or made available to students at this institution: XX Attached to Enrollment Agreement XX Provided in Current Academic Catalog XX Reported on School Website Other:
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**Per Section 1095.200 of 23 Ill. Adm. Code 1095:**

*The following information must be submitted to the Board annually; failure to do so is grounds for immediate revocation of the permit of approval.*

DISCLOSURE REPORTING CATEGORY Information Updated: June, 2022	Magnetic Resonance Imaging (MRI) Technologist CIP 51-0920	Ultrasound/Sonography Technician CIP 51-0910	Licensed Practical Nursing Program CIP 51-3901		
A) For each program of study, report:					
1) The number of students who were admitted in the program or course of instruction* as of July 1 of this reporting period.	0	0	0		
2) The number of additional students who were admitted in the program or course of instruction during the next 12 months and classified in one of the following categories:					
a) New starts	19	41	6		
b) Re-enrollments	0	0	0		
c) Transfers into the program from other programs at the school	0	0	0		
3) The total number of students admitted in the program or course of instruction during the 12-month reporting period (the number of students reported under subsection A1 plus the total number of students reported under subsection A2).	19	41	6		
4) The number of students enrolled in the program or course of instruction during the 12-month reporting period who:					
a) Transferred out of the program or course and into another program or course at the school	0	0	0		
b) Completed or graduated from a program or course of instruction	15	31	0		
c) Withdrew from the school	4	10	0		
d) Are still enrolled	0	10	6		
5) The number of students enrolled in the program or course of instruction who were:					
a) Placed in their field of study	10	16	N/A		
b) Placed in a related field	5	2	N/A		
c) Placed out of the field	0	1	N/A		
d) Not available for placement due to personal reasons	0	1	N/A		
e) Not employed	0	1	N/A		
B1) The number of students who took a State licensing examination or professional certification examination, if any, during the reporting period.	10	16	N/A		
B2) The number of students who took and passed a State licensing examination or professional certification examination, if any, during the reporting period.	8	12	N/A		
C) The number of graduates who obtained employment in the field who did not use the school's placement assistance during the reporting period; such information may be compiled by reasonable efforts of the school to contact graduates by written correspondence.	10	12	N/A		
D) The average starting salary for all school graduates employed during the reporting period; this information may be compiled by reasonable efforts of the school to contact graduates by written correspondence.	\$28	\$28	\$28		

\*Course of Instruction is defined as a stand-alone course that meets for an extended period of time and is directly creditable toward a certificate or other completion credential; individual courses that make up a Program of Study are not considered courses of instruction.

**Note:** As indicated in the PBVS Administrative Rules, Section 1095.200, student retention and graduation rates must be maintained that are appropriate to standards in the field. Furthermore, a State licensing examination or professional certification examination passage rate of at least 50% of the average passage rate for schools within the industry for any State licensing examination or professional certification examination must be maintained.

- In the event that the school fails to meet the minimum standards, that school shall be placed on probation.
- If that school's passage rate in its next reporting period does not exceed 50% of the average passage rate of that class of schools as a whole, then the Board shall revoke the school's approval for that program to operate in this State. Such revocation also shall be grounds for reviewing the approval to operate as an institution.

Aquarius Institute 2023 – 2024 Academic Calendar  
MRI Technologist Program  
Ultrasound Sonography Program  
Licensed Practical Nurse Program

Fall Start Session:  
September 2023

Fall Ends Session:  
N/A

Winter Start Session:  
January 2024

Winter Ends Session:  
N/A

Spring Start Session:  
March 2024

Spring Ends Session:  
N/A

Summer Start Session:  
July 2023

Summer Ends Session:  
N/A

Aquarius will be closed for all major holidays as well as the eve of 2 holidays: As Follows

Labor Day (September 4, 2023)

Thanksgiving Day (November 23, 2023)

Christmas Eve (December 24, 2023)

Christmas Day (December 25, 2023)

New Years Eve (December 31, 2023)

New Years Day (January 1, 2024)

Memorial Day (May 27, 2024)

Independence Day (July 4, 2023)

MAGNETIC RESONANCE IMAGING (MRI) TECHNOLOGIST  
PROGRAM CATALOG

MC – 900

CIP Code 51-0920

Call The Aquarius Institute 1-847-296-8870 and speak with a student counselor.

or visit [www.aquariusinstitute.com](http://www.aquariusinstitute.com) for more information.

Convenient Chicago-area location:

O'Hare

1011 East Touhy Ave.

Des Plaines, IL - 60018

1-847-296-8870

