BHS in Clinical and Diagnostic Sciences with Emphasis in Radiochemical Manufacturing

Program will begin admitting students in Summer 2027.

Degree Program Description

The Radiochemical Manufacturing (RCM) program prepares students to enter the growing field of radiochemistry, where radioactive materials are produced, tested, and applied across healthcare, environmental sciences, industry, and research. Students gain a strong foundation in radiation applications, contamination control, regulatory compliance, and quality assurance, while advancing to specialized coursework in isotope production, radiochemical integrity, and good manufacturing practices. A hallmark of the program is its two semesters of hands-on internships at professional sites, where students apply their skills in real-world laboratory and manufacturing environments while developing professional competencies under expert supervision. Graduates of the program are well prepared for careers in radiopharmaceutical manufacturing, nuclear medicine support industries, environmental radiochemistry, industrial process monitoring, or for pursuing advanced degrees in related fields. With a combination of rigorous academics, applied training, and strong career demand, the RCM program offers a direct pathway to a rewarding career at the intersection of science, technology, and healthcare.

Major Program Requirements

To earn the BHS in Clinical and Diagnostic Sciences with emphasis in Radiochemical Manufacturing degree, students must meet degree and University requirements (https://catalog.missouri.edu/academicdegreerequirements/universityrequirements/), including University general education (https://catalog.missouri.edu/academicdegreerequirements/generaleducationrequirements/) requirements. Students must complete the Program Pre-requisite courses below with a grade of C or higher. All Major Core Requirements require a grade of C (2.0) or higher, unless otherwise noted.

Program Pre-Requisites		**44**
MATH 1100	College Algebra	3
or MATH 1400	Calculus for Social and Life Sciences I	
or MATH 1500	Analytic Geometry and Calculus I	
ENGLSH 1000	Writing and Rhetoric	3
STAT 1200	Introductory Statistical Reasoning	3
or STAT 2500	Introduction to Probability and Statistics I	
BIO_SC 1010 & BIO_SC 1020	General Principles and Concepts of Biology and General Biology Laboratory	5
or BIO_SC 1500	Introduction to Biological Systems with Laboratory	
CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
CHEM 2100	Organic Chemistry I	3
CDS 2190	Medical Terminology	3
CDS 3100	Introduction to Research	3
MICROB 2800	Microbiology for Nursing and Health Professions	2-4
or MICROB 3200	Medical Microbiology and Immunology	
or BIO_SC 3750	General Microbiology	
or BIO_SC 3760	Microbiology Laboratory	
MPP 3202	Elements of Physiology	5
or BIO_SC 3700	Human Physiology	
PHYSCS 1210	College Physics I	4
NUCMED 1000	Introduction to Nuclear Medicine	1
Major Core Requirements		**44**
CHEM 4600	Introduction to Radiochemistry with Lab	3
CDS 4328	Radiation Safety and Biology	4
CDS 4480W	Clinical Ethics - Writing Intensive	3
NUCMED 3258	Radiochemical Instrumentation	3
NUCMED 4232	Regulation of Radioisotopes	3
NUCMED 4329	Radiopharmaceuticals in Nuclear Medicine	3
NUCMED 4841	Microbiological Control and Radiation Monitoring	4
NUCMED 4842	Statistical Analysis in Radioisotope Manufacturing	2
NUCMED 4843	Quality Control of Radiochemical Products	3
NUCMED 4940	Nuclear Clinical Internship II	6
NUCMED 4941	Nuclear Clinical Internship III	7
RA_SCI 3160	Radiologic Physics	3-4
or PHYSCS 1220	College Physics II	

Capstone Project Requirement

As part of their culminating academic experience, students in the Radiochemical Manufacturing (RCM) program are required to complete a capstone project during their internship sequence. The capstone serves as both a synthesis and demonstration of the skills and knowledge students have acquired throughout their coursework and applied learning experiences. It provides students the opportunity to engage in an in-depth project that addresses a practical problem or emerging issue relevant to the radiochemistry, contamination management, or radiopharmaceutical fields.

Capstone projects are designed to integrate the technical, regulatory, and analytical competencies central to the program's educational objectives. These projects may take a variety of forms depending on the student's placement site and professional interests, but all will require students to demonstrate independent problem-solving, data analysis, and professional communication. Examples of potential projects include:

- **Contamination Monitoring and Control:** Developing and validating a clean room monitoring protocol to track microbial or particulate contamination trends and proposing evidence-based corrective actions.

- **Regulatory Compliance Assessment:** Conducting a gap analysis of a laboratory's documentation and quality assurance procedures relative to FDA, NRC, or GMP standards and recommending improvements.
- **Radioisotope Production and Quality Testing:** Designing and performing quality assurance tests to evaluate the radiochemical integrity of a product under varying storage or transport conditions.
- **Waste Management Optimization:** Evaluating current radioactive or biological waste disposal practices at the internship site and proposing safer, more cost-effective, or more compliant alternatives.
- **Statistical Process Control:** Using tools such as MINITAB to analyze production or environmental monitoring data, identify trends, and establish meaningful action and alert limits for ongoing quality assurance.

The capstone project not only reinforces the skills and concepts introduced in the classroom but also encourages students to apply them in authentic, professional contexts. Deliverables typically include both a written technical report and an oral presentation to the site supervisor and faculty, ensuring that students can effectively communicate their findings to both academic and professional audiences.

By requiring a capstone project, the program ensures that graduates demonstrate the ability to integrate theory with practice, to operate independently in a professional setting, and to contribute meaningfully to the industries they will serve.

Semester Plan

Below is a sample plan of study, semester by semester. A student's actual plan may vary based on course choices where options are available.

First Year				
Fall	**CR**	**Spring**	**CR**	
BIO_SC 1010 & BIO_SC 1020	5	CHEM 1400 & CHEM 1401	4	
American Histroy/Government	3	MICROB 2800	4	
Social/Beh Science	3	ENGLSH 1000	3	
NUCMED 1000 (optional)	1	STAT 1200	3	
		Elective	1	
	12		**15**	
Second Year				
Fall	**CR**	**Spring**	**CR**	
CHEM 1410	3	CHEM 2100	3	
CDS 2190	3	PHYSCS 1210	4	
WI Humanities	3	2000+ level Humanities	3	
Social/Beh Science	3	CDS 3100	3	
Elective	3	Elective	3	
	15		**16**	
Third Year				
Fall	**CR**	**Spring**	**CR**	
RA_SCI 3160 or PHYSCS 1220	3	CHEM 4600	3	
CDS 4328	4	NUCMED 4329	3	
MPP 3202	5	NUCMED 4841	4	
Humanities	3	NUCMED 4842	2	
		Elective or NUCMED recommendation	3	
	15		**15**	
Fourth Year				
Fall	**CR**	**Spring**	**CR**	
BIOCHM 3630	3	NUCMED 4941	9	
NUCMED 4940	9	NUCMED 4232	3	
NUCMED 4843	3	CDS 4480W	3	
Elective or NUCMED recommendation	3	Elective	1	
	18		**16**	

Total Credits: 122

Degree Audit

The degree audit is an automated report reflecting a student's academic progress toward the completion of a degree.

MU students can request a degree audit by logging in to myDegreePlanner (https://mydegreeplanner.missouri.edu). Students may also access myDegreePlanner via myZou, in the Student Center, click on the Academic Progress Tile, then select Request Degree Audit. The audit automatically pulls in the student's MU course work, transfer courses and courses in progress. This is available to current students, admitted students, and those who last attended less than three terms ago.

Past MU students can request a degree audit by contacting the Academic Advising Unit of the division in which they were last enrolled at MU. For contact information, go to https://advising.missouri.edu/contact/.

Prospective students, can access a preliminary MU degree audit via https://www.transferology.com (https://www.transferology.com/). Information on the college credits already earned will have to be manually entered before it can be evaluated against current degree requirements.

For additional details on degree audits, go to https://registrar.missouri.edu/degrees-audits/degree-audits/.

Major and Career Exploration

The University of Missouri has many resources to assist you in exploring majors and career possibilities. For guidance, visit the Majors and Careers (https://career.missouri.edu/career-and-major-exploration/) website or view specific resources below.

- **Change your Major.** If you are considering changing your undergraduate major or are choosing between several majors, schedule an appointment with an advisor in the Discovery Center (https://discoverycenter.missouri.edu/) by calling (573) 884-9700 or through the Discovery Center service in your MU Connect (https://mizzou.starfishsolutions.com/starfish-ops/dl/instructor/serviceCatalog.html?bookmark=service/3761489) success network.
- **Decided on a Major.** If you have decided on a major, visit an academic advisor in the School or College that you are interested in to discuss the process of declaring that major (https://advising.missouri.edu/majors-minors/changing-major/).
- **Identify your Interests and Strengths.** If you would like to learn more about your career interests, abilities, values, and talents, visit the staff at the MU Career Center (https://career.missouri.edu/). No appointment is necessary to explore career options with one of our staff members.
- **Explore MU Majors.** If you would like information about MU majors and degree programs, visit Majors at Mizzou (https://majors.missouri.edu/) or the Degrees, Majors (Degree Programs), Emphasis Areas, Minors and Certificates (https://

catalog.missouri.edu/degreesanddegreeprograms/) page in the catalog.

For additional major and career exploration resources, visit Major & Career Exploration (https://catalog.missouri.edu/majorcareerexploration/) in the catalog.