Course Syllabus
Radiochemistry & Radiopharmacy
NMTT 2401

Semester with Course Reference Number (CRN)
SPRING 2012 CRN 84749

Instructor contact information (phone number and email address)
L. Rene Hyder: 713-718-7355; rene.hyder@hccs.edu

Office Location and Hours
Coleman College, Room 524
Office Hours: Tue., 9:00-11:00; Thurs. 9:00-12:00 & others TBA

Course Location/Times
Mondays: 8:45-12:00 & Wednesdays: 1:00-4:00

Course Semester Credit Hours (SCH) (lecture, lab) If applicable
Credit Hours 4.00
Lecture Hours 3.00
Laboratory Hours 3.00
External Hours

Total Course Contact Hours 96.00

Continuing Education Units (CEU): if applicable
N/A

Course Length (number of weeks) 15 weeks

Type of Instruction Lecture/Lab

Course Description: Includes radioactive decay and production of radionuclides. Emphasis on radiopharmaceuticals and their ideal characteristics, biodistribution, and clinical applications. Incorporates quality control tests and mathematical equations.
PREREQUISITE(S):
- CHEM 1405

FREQUENT REQUISITES
- College Level Writing
- Departmental approval
- Admission to the Program
- College Level Reading
- College Level Mathematics

Academic Discipline/CTE Program Learning Outcomes
1. Demonstrate radiation safety techniques to minimize radiation exposure.
2. Demonstrate quality control procedures.
3. Perform imaging and non-imaging nuclear medicine procedures.
4. Correlate different nuclear medicine procedures normal anatomy and abnormal pathology on a nuclear medicine image.
5. Demonstrate patient care tasks in the patient care course lab setting.
6. Prepare/administer radiopharmaceuticals.

Course Student Learning Outcomes (SLO): 4 to 7
1. Assess methods of radionuclide production
2. Evaluate methods of radiolabeling
3. Explain the mechanism of localization of radiopharmaceuticals
4. Perform quality control tests and mathematical calculations in the radiopharmacy

Learning Objectives (Numbering system should be linked to SLO - e.g., 1.1, 1.2, 1.3, etc.)
Assess methods of radionuclide production
1. Evaluate the methods by which radionuclides are produced

Evaluate methods of radiolabeling
1. Prepare radiopharmaceutical kits.
2. Evaluate a radiopharmaceutical kits purity.

Explain the mechanism of localization of radiopharmaceuticals
1. Identify the normal biorouting of technetium pertechnetate.
2. Explain why the various radiopharmaceuticals localize in different organs & organ systems.

Perform quality control tests and mathematical calculations in the radiopharmacy
1. Calculate the appropriate dosage of each radiopharmaceutical using time, activity concentration and half-life.

SCANS and/or Core Curriculum Competencies: If applicable
SCANS
Assess methods of radionuclide production
Workplace Competencies - Information - Acquires & Evaluates
Workplace Competencies - Technology - Applies Technology to Task
Evaluate methods of radiolabeling
Explain the mechanism of localization of radiopharmaceuticals
Perform quality control tests and mathematical calculations in the radiopharmacy
Foundation Skills - Basic - Mathematics
### Course Calendar

**Classes**
- Mon. 8:45-12:00
- Room 575

**Laboratory**
- Wed. 1:00 - 4:00 pm
- Room 575
- OR
- Cardinal Health, 7859 Almeda Rd. > 713-748-3303 * Instructor - Mike Melichar *

### Class Schedule - Spring 2012

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>ASSIGNMENT</th>
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</table>
| 1    | 1/9  | Introduction to NMTT 2401  
Radiochemistry of Other Selected Nuclides: pp. 166-172  
* Radiochemical Testing  
Kit insert information & Manufacturer: pp. 165  
Preparation of Tc-99m-Sulfur Colloid/ Disofenin |
|      | 1/11 | * Radiation Safety & Calculations/ Math Review  
Radiation Safety & Calculations/ Math Review |
| 2    | 1/16 | MLK Holiday |
|      | 1/18 | * Aseptic Technique & UPS 797: HAZMAT |
| 3    | 1/23 | Radionuclide Production: Reactors, Cyclotrons & Generators: pp. 151-158; PM 23-24 |
|      | 1/25 | * Instrumentation - Counting and Calibration  
(Including Linearity) |
| 4    | 1/30 | Radionuclide Generator Systems  
Radiochemistry of 99m Technetium: pp. 159-160  
* Elution of 99-Mo/ 99m-Tc Generator  
Radionuclidic & Alumina Testing: PM 23-3 |
| 5    | 2/6  | Major Exam I |
|      | 2/8  | Radiochemistry of Other Selected Nuclides: pp. 166-172  
* Radiochemical Testing  
Kit insert information & Manufacturer: pp. 165  
Preparation of Tc-99m-Sulfur Colloid/ Disofenin |
| 6    | 2/13 | Radiopharmaceutical Quality Assurance: pp 173-181  
Radiopharmaceuticals for lung V/Q: Chap. 16  
PM: 70-72; 110,114,123  
Lecture Review  
* Review for Mid Term |
<p>| 7    | 2/20 | President’s Day Holiday |
|      | 2/22 | * Mid Term Laboratory Exam |
| 8    | 2/27 | Mid-Term Exam |
|      | 2/29 | * Syntrac Training <strong>Coleman</strong> |</p>
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<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>ASSIGNMENT</th>
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<tbody>
<tr>
<td>9</td>
<td>3/5</td>
<td>Gastrointestinal Radiopharmaceuticals: Chaps. 18 &amp; PM: 51-54,57-61; 100,113,118,120</td>
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<td></td>
<td>3/7</td>
<td>* Preparation Tc-99m MAA kit</td>
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<td>3/12-16</td>
<td><strong>SPRING BREAK</strong></td>
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<tr>
<td>10</td>
<td>3/19</td>
<td>Cardiac Radiopharmaceuticals: Chap. 17: 503-508 PM: 36-40; 91,104,106,118,119,121,122</td>
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<tr>
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<td>3/21</td>
<td>Cardiac Pharmacological stress/ Infusion</td>
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<td>11</td>
<td>3/26</td>
<td>Skeletal Imaging Radiopharmaceuticals: Chap. 20: 589-593 &amp; PM: 74-75; 116</td>
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<td>CNS Radiopharmaceuticals: Chap. 14: 420-426 PM: 41-44; 91,111,112</td>
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<td>Tumor and Inflammation Disease Imaging: Chap. 22: 628-639 PM: 67-69, 76-80; 91,93,97-99,101,103</td>
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<td></td>
<td>3/28</td>
<td>* Leukocyte Labeling</td>
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<td>Lymphoscintigraphy Rp: pp 639-641; PM 35</td>
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<td><strong>2nd Hour Exam</strong></td>
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<td>4/4</td>
<td>*Preparation of Tc-99m-DTPA / MAG3 kits</td>
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<tr>
<td>13</td>
<td>4/9</td>
<td>Endocrine Agents: Chapter 15: 444-452, 467-469, 474-479 PM 45-50; 94-97,117, 119</td>
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<td></td>
<td>4/11</td>
<td>Non-Radioactive Pharmaceuticals : 231</td>
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<td></td>
<td>* Review for Lab Final</td>
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<td></td>
<td></td>
<td>Review Calculations</td>
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<td>14</td>
<td>4/16</td>
<td>Misc. Radiopharmaceuticals: PM: 33,35,55,56,66,73,90</td>
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<tr>
<td></td>
<td>4/18</td>
<td>Review for Final</td>
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<td></td>
<td>* * Laboratory Final</td>
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<td>15</td>
<td>4/23</td>
<td>Review for Final</td>
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<tr>
<td>16</td>
<td>4/25</td>
<td>Final Exam</td>
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**Instructional Methods**

- Web-enhanced (49% or less)  
- Face to Face

**Student Assignments**

- Assess methods of radionuclide production  
- Discussions  
- Lab Exercises  
- Homework Exercises  
- Readings
Evaluate methods of radiolabeling
Discussions
Lab Exercises
Homework Exercises
Readings

Explain the mechanism of localization of radiopharmaceuticals
Discussions
Lab Exercises
Homework Exercises
Readings

Perform quality control tests and mathematical calculations in the radiopharmacy
Discussions
Lab Exercises
Homework Exercises
Readings

**Student Assessment(s)**

Assess methods of radionuclide production
In-class discussions
Quizzes/Tests which may include: definitions, matching, multiple choice, true/false, short answer, brief essay
Various assigned readings from textbooks

Evaluate methods of radiolabeling
In-class discussions
Quizzes/Tests which may include: definitions, matching, multiple choice, true/false, short answer, brief essay
Various assigned readings from textbooks

Explain the mechanism of localization of radiopharmaceuticals
In-class discussions
Quizzes/Tests which may include: definitions, matching, multiple choice, true/false, short answer, brief essay
Various assigned readings from textbooks

Perform quality control tests and mathematical calculations in the radiopharmacy
In-class discussions
Quizzes/Tests which may include: definitions, matching, multiple choice, true/false, short answer, brief essay
Various assigned readings from textbooks

**Instructor's Requirements**

This is a web-enhanced course and therefore the student is expected to look for course materials and updates on blackboard

Periodic pop quizzes will be given for continual evaluation of student understanding and retention of the material presented during the lecture. Students should check blackboard 24 hours before class.

All class assignments are to be completed and turned in at the beginning of the next class. A student will lose 10 points on an assignment if the assignment is not turned in at the beginning of the next class and will lose 10 additional points a day (not including weekends) until the assignment is submitted. After the assignment has been graded and returned, late work will not be accepted

Cell Phone: The first phone that rings during class will not be penalized. Any subsequent rings will result in a 2 point reduction off the next major exam. Cell phones must be off during major exams.
Laptops: May be used to take notes; however, if you are found to be using the laptop in any other manner during class, YOU WILL NOT BE ALLOWED TO BRING THE LAPTOP TO CLASS AFTER THIS OCCURS!

Examination questions will be taken from the reading assignments, the lab assignments as well as from the material presented during the lecture.

Program/Discipline Requirements: If applicable

THERE WILL BE NO MAKE-UP EXAMINATIONS FOR CLASSROOM OR LABORATORY

Any student absent from a major exam will have the percentage (%) value of that exam added to the percentage value of the final exam.

Final examinations must be taken on the day and time designated by the instructor, unless there is a personal illness, accident or death in the immediate family (parent, child, brother, sister, spouse or grandparent). In the event any of these occur, the student must call and speak personally with the instructor or department head on the day of the examination. The student must provide documented evidence of the reason for missing the examination: doctor’s statement in the case of personal illness, an accident report in the case of an accident, or obituary or funeral program in the case of death in the immediate family. This documentation must be provided prior to taking a make-up final examination. The make-up final must be taken within 7 working days from the original test date or at the discretion of the instructor. In the case of a severe injury or long term illness, the student will be given an "I", incomplete, until the final examination is taken. An "I" will automatically turn into an "F" if the student does not take the examination by the end of the following term (excluding Summer). A student may not register for the next semester's nuclear medicine technology courses, if they have an incomplete in any of their nuclear medicine technology courses.

If notification on the day of a missed final examination to the involved instructor/department head by the student is not made, a student will receive a 0 for their final exam grade and course's final grade will be calculated as prescribed in the individual course syllabi. Also, if documented evidence as described in the preceding paragraph is not provided, a student will receive a 0 on their final examination.

HCC Grading Scale

** NOT THE GRADING SCALE USED IN THIS PROGRAM **

A = 100 - 90: 4 points per semester hour
B = 89 - 80: 3 points per semester hour
C = 79 - 70: 2 points per semester hour
D = 69 - 60: 1 point per semester hour
59 and below = F 0 points per semester hour
IP (In Progress) 0 points per semester hour
W (Withdrawn) 0 points per semester hour
I (Incomplete) 0 points per semester hour
AUD (Audit) 0 points per semester hour

IP (In Progress) is given only in certain developmental courses. The student must re-enroll to receive credit. COM (Completed) is given in non-credit and continuing education courses. To compute grade point average (GPA), divide the total grade points by the total number of semester hours attempted. The grades "IP," "COM" and "I" do not affect GPA.
For Health Science programs, see the Program/Discipline Requirements section for specific grading requirements.

NMTT Program Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
</tr>
<tr>
<td>B</td>
<td>80 – 89</td>
</tr>
<tr>
<td>C</td>
<td>75 – 79</td>
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<tr>
<td>F</td>
<td>Below 75</td>
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Remember: You need a C or better to continue to the next semester.

Instructor Grading Criteria

METHOD FOR DETERMINING COURSE GRADE

- Quizzes and Homework: 7%
- Major Exams: 13%
- Laboratory Mid-Term: 10%
- Laboratory Final: 10%
- Mid-Term Examination: 25%
- Final Examination: 35%

Instructional Materials


HCC Policy Statement: For more specific/updated information go to web sites listed below

Students are responsible for conducting themselves with honor and integrity in fulfilling course requirements. Penalties and/or disciplinary proceedings may be initiated by College System officials against a student accused of scholastic dishonesty.

“Scholastic dishonesty” includes, but is not limited to, cheating on a test, plagiarism and collusion.

“Cheating” on a test includes:

- Copying from another student’s test paper;
- Using materials during a test that are not authorized by the person giving the test;
- Collaborating with another student during a test without authority;
- Knowingly using, buying, selling, stealing, transporting, or soliciting in whole or part the contents of an un-administered test;
- Bribing another person on obtain a test that is to be administered

“Plagiarism” means the appropriation of another’s work and the unacknowledged incorporation of that work in one’s own written work offered for credit.

“Collusion” means the unauthorized collaboration with another person in preparing written work offered for credit.

Possible punishments for academic dishonesty may include a grade of “0” or “F” on the particular assignment, failure in the course, and/or recommendation for probation or dismissal from the College System. A recommendation for suspension or expulsion will be referred to the College Dean of Students for disciplinary disposition.
ATTENDANCE
Research has shown that the single most important factor in student success is attendance! Therefore, attendance and punctuality are mandatory. HCCS policy states that students absent from this course for more than 12.5% of the total hours of instruction will be administratively dropped. This class has 96 contact hours. A student may be dropped after 12 hours of absence from lab and lecture combined.

If a student enters the class more than thirty minutes after the class has begun or leaves more than thirty minutes early, they will be counted absent on that day.

Poor attendance records tend to correlate with poor grades. If you miss any class, you are responsible for all material missed. It is good idea to find a friend or a buddy in class who would be willing to share class notes or discussion or be able to hand in paper if you unavoidable miss a class.

3-PEATERS
The State of Texas encourages students to complete college without having to repeat failed classes. To increase student success, students who repeat the same course more than twice, are required to pay extra tuition. The purpose of this extra tuition fee is to encourage students to pass their courses and to graduate. Effective fall 2006, HCC has been charging a higher tuition rate to students registering the third or subsequent time for a course. If you are considering course withdrawal because you are not earning passing grades, confer with your instructor/counselor as early as possible about your study habits, reading and writing homework, test taking skills, attendance, course participation, and opportunities for tutoring or other assistance that might be available.

WITHDRAWAL
If you feel that you cannot complete this course, you will need to withdraw from the course prior to the final date of withdrawal, November 3, 2011. Before you withdraw from your course, please take time to meet with the instructor to discuss why you feel it is necessary to do so. The instructor may be able to provide you with suggestions that would enable you to complete the course. Your success is very important. Beginning in fall 2007, the Texas Legislature passed a law limiting first time entering freshmen to no more than SIX total course withdrawals throughout their educational career in obtaining a certificate and/or degree.

To help students avoid having to drop//withdraw from any class, HCC has instituted an Early Alert process by which your professor may “alert” you and HCC counselors that you might fail a class because of excessive absences and/or poor academic performance. It is your responsibility to visit with your professor or a counselor to learn about what, if any, HCC interventions might be available to assist you- online tutoring, child care, financial aid, job placement, etc. – to stay in class and improve your academic performance.

If a student feels that they cannot complete the course, he or she will need to withdraw from the course prior to the final date of withdrawal. Before withdrawing, the student should meet with the instructor to discuss the decision. After withdrawal, the student must meet with the department head to complete an exit interview (refer to the nuclear medicine technology handbook for more information)

Access Student Services Policies http://hccs.edu/student-rights
on their Web site:

**EGLS3 -- Evaluation for Greater Learning Student Survey System**

At Houston Community College, professors believe that thoughtful student feedback is necessary to improve teaching and learning. During a designated time near the end of the term, you will be asked to answer a short online survey of research-based questions related to instruction. The anonymous results of the survey will be made available to your professors and department chairs for continual improvement of instruction. Look for the survey as part of the Houston Community College Student System online near the end of the term.

**Distance Education and/or Continuing Education Policies**


Access CE Policies on their Web site: [http://hccs.edu/CE-student-guidelines](http://hccs.edu/CE-student-guidelines)