PHYSICS
Diagnostic Imaging
Physics of Radiology
203-BXB-05 (Sections 1 & 2)
Fall 2016

Teacher — *Michelle Baryliuk-Raimbert* 7A.24, local 4022, mraimbert@dawsoncollege.qc.ca

Pre-requisites — Mathematics 564-506 or 565-506 or Mathematics 526; Science 558-404 or 558-402 or Physical Science 436

Co-requisites — Basic Radiographic Imaging (142-BYB-03)

Ponderation — 3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class per week)

Course objectives — The aim of this course is to analyze the physical phenomena related to physical imaging (005A). This includes a review of mathematics pertinent to the course; understanding of basic mechanics (emphasizing force, energy, power and conservation laws), structure of matter and modern physics, electricity and magnetism (in more detail), DC and AC devices, production and properties of x-rays, x-ray system components and their functions, and interaction of x-rays with matter.

Detailed information regarding the objectives and standards for the competencies related to this course and the specific performance criteria is available at https://www.dawsoncollege.qc.ca/oad/professional-development/ministerial-program-documents/.

Course competencies — This course will allow the student to fully achieve the competency:
005A: Analyze the physical phenomena related to physical imaging.

1. To recognize the nature of the physical phenomena.
2. To distinguish the components of the phenomenon.
3. To determine which salient points are necessary to understanding the phenomenon.
4. To apply this knowledge to explain the relationship between the different components of the said phenomenon.
5. To determine the nature of the technical operations associated with the said phenomenon.

Evaluation — The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website.

There are two grading schemes. **Your final grade will be the higher of the two schemes.**

Assignments, quizzes and class tests[y]	50%	30%
Laboratory activities	20%	20%
Final exam (cumulative)	30%	50%

[y] Your teacher will provide a detailed breakdown of these components and a tentative test schedule during the first week of class.

In order to pass the course, students must show a basic understanding of the course material at the level covered in the lectures and in the lab. This is achieved by attaining a final grade of at least 60%, calculated according to the evaluation scheme above. **Note: course work not submitted by the due date may be penalized at the teacher's discretion.**

Reference materials

1. **Radiologic Science for Technologists by Stewart Carlyle Bushong, 10th edition with workbook.** The textbook and workbook are available as a package at the bookstore.
2. **Library copies:** Copies of the textbook are available on reserve in the Dawson Library.
3. **Reference material:** The Physics of Diagnostic Radiology by Christensen and The Physics of Radiology by Johns & Cunningham. Both books are available at the Dawson Library.

Teaching methods

The material will be presented using a mix of active learning activities, lectures, in-class problem solving, laboratory experiments and demonstrations. Laboratory periods will be used for experiments as well as class tests and lectures.

Attendance & participation

Although class attendance is not compulsory, students should make every e ort to attend all classes. In the event that a class is missed, the student is responsible for all material covered or assigned during that class. Attendance during laboratory experiments and for class tests is however compulsory. In the rare event that a student for valid reason (*e.g.* due to an intensive course, illness, *etc.*) is or anticipates to be absent during a laboratory experiment or for a class test, the student must, where possible, inform the teacher and provide the necessary documents before the absence or, at the latest, on the day of their return. If the absence is excused, students will have the opportunity to complete the assessment.

All other assessments (readings, quizzes, lab activities, *etc.*) missed due to absence are:

- assigned a grade of zero where the absence is not excused;
- given zero weight in the calculation of the nal grade where the absence is excused.

For additional information regarding attendance, students should refer to the Institutional Student Evaluation Policy (ISEP section III-C).

Literacy standards

It is expected that students will be able to comprehend the course material and express themselves appropriately as a normal part of their academic performance in the course. Marks may be deducted for inadequate communication skills.

Laboratory work

Experimentation is an essential part of science. Students will be expected to perform experiments and report on their results. Your teacher will provide you with instructions for lab experiments and activities (there is no manual to purchase). Students must be present during the entire lab activity to receive credit.

Student conduct

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students (ISEP section II-D). Disruptions or excessive noise will not be tolerated. Students who do not comply with these rules will be asked to leave the class and may be referred to Student's Services for disciplinary action. Mutual respect is the key to a harmonious learning environment.

Academic integrity

Cheating, copying, or any other form of academic dishonesty will not be tolerated. Students should acquaint themselves with the policy of the College on plagiarism and cheating. According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism a ecting a student's grade (ISEP section IV-C). The usual penalty for the rst instance of cheating will be a grade of zero for the piece of work in question to all parties involved (under certain circumstances, even a rst o ence may be penalized by failure in the course). A second o ence may result in the failure of the course. Students should note that using someone else's laboratory data without authorization from the student and the teacher is cheating.

Intensive course con icts

If a student is attending an intensive course, the student must inform the teacher, within the rst two weeks of class, of the speci c dates of any anticipated absences.

Policy on religious observance

Students who intend to observe religious holidays must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance (ISEP Section III-D), within the rst two weeks of the semester. Forms for this purpose are available from your teacher. Your teacher will inform you of any modi cations to planned course activities resulting from the teacher's own religious commitments.

Course content

The material to be covered is contained in the following chapters and sections of the text.

Weeks	Topics	Chapter & Section
1{2	Math review and essential concepts of radiologic science	Ch.1: All sections
2{3	The structure of matter	Ch.2: All sections
3{5	Electromagnetic energy	Ch.3: All sections
6{7	Electricity, magnetism, and electromagnetism	Ch.4: All sections
7{8	The x-ray imaging system	Ch.5: All sections
8{10	The x-ray tube	Ch.6: Up to page 119 (Rating Charts)
11{12	X-ray production	Ch.7: All sections
12{13	X-ray emission	Ch.8: All sections
13{15	X-ray interaction with matter	Ch.9: All sections

Questions outside class

All regular day program teachers will be available in their respective o ces to their students during posted o ce hours. In the rst week, your teacher will inform you of their schedule and will post it outside their o ce.

Room 7A.1 is the physics study room. At scheduled times, a teacher or peer tutor will be on duty there to answer your questions. The schedule of teachers and peer tutors will be posted outside of 7A.1 in the 2nd or 3rd week of term.