

**PHYSICS 115.3: PHYSICS AND THE UNIVERSE**  
**Fall 2023 – Section 97**

**Instructor:**

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Office: Room 132.2 Physics

Office Hours: Mondays 12:00 PM -12:30 PM or after the labs

**Lectures (in person):**

Mondays, 12:30 PM – 3:20 PM

**Laboratorials (in person):**

Mondays, 3:30 PM – 6:20 PM

**Course Description:**

- Study of the basic principles of physics through a survey of various fields of the subject;
- Study of the applications of physics principles to technology, health sciences, and other scientific fields;
- Development of analytical, mathematical, and problem-solving skills; and
- Practical application of the scientific method through laboratory experimentation.

**Prerequisites:** Physics 30 and (Foundations of Mathematics 30; or Pre-Calculus 30; or Mathematics B30 and C30).

*Students must have previously obtained credit for all prerequisites.*

*Contact me as soon as possible if you are missing any prerequisite.*

**Treaty Acknowledgement**

As we gather here today, we acknowledge we are on Treaty Six Territory and the Homeland of the Métis. We pay our respect to the First Nation and Métis ancestors of this place and reaffirm our relationship with one another.

**Integrity Defined (from the Office of the University Secretary)**

The University of Saskatchewan is committed to the highest standards of academic integrity (<https://academic-integrity.usask.ca/>). Academic misconduct is a serious matter and can result in grade penalties, suspension, and expulsion.

**Prepare for Integrity**

Students are expected to act with academic integrity.

- Students are encouraged to complete the Academic Integrity Tutorial to understand the fundamental values of academic integrity and how to be a responsible scholar and member of the USask community (tutorial link: <https://libguides.usask.ca/AcademicIntegrityTutorial>).
- Students can access campus resources that support development of study skills, time and stress management, and ethical writing practices important for maintaining academic integrity and avoiding academic misconduct.

## Responses to Misconduct

Students are expected to be familiar with the academic misconduct regulations (<https://governance.usask.ca/student-conduct-appeals/academic-misconduct.php#About>).

- Definitions appear in Section II of the academic misconduct regulations.
- The academic misconduct regulations apply regardless of type of assessment or presence of supervision during assessment completion.
- Students are advised to ask for clarification as to the specific expectations and rules for assessments in all their courses.
- Students are urged to avoid any behaviour that could result in suspicions of cheating, plagiarism, misrepresentation of facts. Students should note that posting copyrighted course materials (e.g., notes, questions, assignments, or exams) to third party websites or services or other forum or media without permission is an academic or non-academic misconduct offense.

Non-academic offenses are dealt with under the [Standard of Student Conduct in Non-Academic Matters and Regulations and Procedures for Resolution of Complaints and Appeals](#).

## Examinations with Access and Equity Services (AES):

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals at any time. Those students who are registered with AES with mental health disabilities and who anticipate that they may have responses to certain course materials or topics, should discuss course content with their instructors prior to course add / drop dates. To access AES programs and supports, students must follow AES policy and procedures. For more information or advice, visit <https://students.usask.ca/health/centres/access-equity-services.php>, or contact AES at 306-966-7273 or [aes@usask.ca](mailto:aes@usask.ca).

Students registered with AES may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.

## Learning Outcomes:

Upon successful completion of this course, students will be expected to be able to:

- draw a diagram that is representative of a physical situation;
- understand the kinematic quantities of distance, displacement, speed, velocity, and acceleration and the corresponding rotational motion quantities;
- understand, explain, and apply the following laws and principles:
  - Newton's Laws of Motion;
  - Conservation of Energy;
  - Conservation of Linear Momentum;
  - Conservation of Angular Momentum;
  - Coulomb's Law;
  - Ohm's Law;
  - Lorentz Force Law.
- identify the appropriate physics principles to solve problems in mechanics, electrostatics, and magnetism.

Information on literal descriptors for grading at the University of Saskatchewan can be found at: <http://students.usask.ca/academics/grading/grading-system.php>.

Please note: There are different literal descriptors for undergraduate and graduate students.

More information on the Academic Courses Policy on course delivery, examinations and assessment of student learning can be found at: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>.

The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors, and the institution. A copy of the Learning Charter can be found at: <https://teaching.usask.ca/about/policies/learning-charter.php>.

### Composition of Grade:

In class responses (up to +5% bonus)	0%
Reading quizzes	5%
Homework Assignments	10%
Laboratories	15%
Midterm (Oct 19 <sup>th</sup> , 7:00 PM – 8:30 PM)	25%
Final Exam (TBA December)	45%
TOTAL	100%

\*Up to 5 bonus marks may be earned by being involved in the class and answering the in-class questions.

**NOTE: It is not possible to pass the course without writing the final exam.** If a student does not write the final exam, a grade calculated using the above proportions, or 49 Incomplete Fail, whichever is **less**, will be submitted.

Extensions and exemptions will not be granted for any quizzes or assignments, with no exceptions other than possibly for AES accommodations. However, at the end of term, your lowest assignment score and lowest reading quiz score will be dropped from the calculation of your grade in the course.

### Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled.

**The PHYS 115 Midterm Exam will be held on Thursday, October 19<sup>th</sup>, from 7:00 to 8:30 PM.** The Midterm Exam will be 90 minutes (an hour-and-a-half) in duration and will include multiple choice questions and word problems.

Final examinations may be scheduled at any time during the examination period (December 9<sup>th</sup> to 23<sup>rd</sup>, including Saturdays); students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of their own for medical or other valid reasons, documentation must be provided

and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures: <http://students.usask.ca/academics/exams.php>

### **Length and Mode of Final Examination**

The Final Examination will be three hours in duration and will include multiple choice questions and word problems.

### **Required Activities Outside of Class Time**

The PHYS 115 Midterm Exam will be held on Thursday, October 19<sup>th</sup>, from 7:00 to 8:30 PM.

### **Required Calculator**

Students are expected to use a basic scientific calculator (e.g., Texas Instruments TI-30X series, Hewlett-Packard HP 10s or 30S) for all PHYS 117 exams. Graphing or programmable calculators, calculator apps, or calculators with communication capability are **not** allowed. For example, HP 35s, Casio fx-50FH, TI-83Plus calculators are **not** allowed. Ask your instructor if you are unsure whether your calculator is acceptable.

### **Required Textbooks (available from <https://bookstore.usask.ca/>)**

- Nelson's Ewa (**Enhanced WebAssign**) + E-text Standalone of "College Physics, 11<sup>th</sup> Edition", by Serway and Vuille (Brooks Cole) **Multi-Term – (Phys 115 & 117):** \$99.95

**or**

- Bundle: "College Physics, 11<sup>th</sup> Edition", by Serway and Vuille (Cengage Canada), Loose-leaf version, W/Ewa (**Enhanced WebAssign**) \$143.50

**or**

- Nelson's Ewa (**Enhanced WebAssign**) + E-text Standalone of "College Physics, 11<sup>th</sup> Edition", by Serway and Vuille (Cengage Canada/Brooks Cole) **Single-Term – (Phys 115 ONLY):** \$73.95

**and**

- Physics 115.3 Lab Manual online (Canvas – Lab Section)

### **Internet Access is Required**

All aspects of the course will be coordinated through Canvas and WebAssign. Students can access the course web site from any location with internet access. Assignments and lab reports will be submitted online so it is important that students have a fast and reliable connection to the internet. It is also strongly recommended that students have access to a tablet or a laptop or desktop computer, not just a smartphone.

### **Supplementary Materials**

- Resources webpage at <https://artsandscience.usask.ca/physics/undergraduates/115-and-117/common-resources.php#Resources>
- See additional documentation near the end of this document.

### **Enhanced WebAssign (EWA)**

- Homework Assignments, Reading Quizzes, and Lab Pre- and Post-Tests (see details in a following section) will be administered and submitted using Enhanced WebAssign ("Enhanced" indicates that you have access to an electronic version of the text). WebAssign

is an online homework management system that was developed by physics educators at North Carolina State University. To register, go to <https://www.webassign.net>

- To use WebAssign you must have an access code. Access codes may be purchased from the Bookstore website (<https://bookstore.usask.ca>) and are also included in the textbook package available for purchase from the Bookstore.
- If you are new to WebAssign, use your U of S email address, NSID@mail.usask.ca, for your WebAssign email address.

The class key to join this course is: **usask.ca 4624 9154**

### Homework Assignments

- \* There will be weekly assignments. Answers to all questions are to be submitted in WebAssign and a written solution for one of the assignment questions is to be submitted in Canvas.
- \* Solve all questions with complete written solutions, following the methods outlined in the lectures and in the Survival Guide (included later in this document).
- \* The assignments will be marked and are intended to help you learn the course material. To increase the usefulness of the assignments as learning tools, you may make two submissions in WebAssign. After your first submission, WebAssign will indicate which of your answers are correct and which are incorrect. You can re-do questions as necessary and re-submit your answers. If you make two submissions, you will receive the highest possible mark based on all your submitted answers. Each correct answer is worth one mark.
- \* The written solution that you submit in Canvas is worth three marks and will be marked in full-mark increments. Your work will be graded for method and process, not whether you obtained the correct answer. The written assignments are due at the beginning of the class on Mondays at 12:30 PM. Late assignments will not be accepted.
- \* The online assignments are due at 6:00 pm (1800) Saskatchewan Time on Fridays. The deadline is sharp and late assignments will not be accepted. Assignments not submitted will receive a mark of zero.
- \* The assignment solutions will be posted to the course web site for your section and will remain posted for the duration of the course.
- \* The marks for each assignment will be posted by your instructor.

## Etiquette

### Classroom Etiquette:

- Set your cell phones to vibrate and mute any other devices whilst in class.

### Email Etiquette:

- All emails to professors, lab instructors, department administrators, etc. are **official communication** with the University **and should be sent using your university email address**.
- Good rules to follow:
  - Course name in subject header, e.g., “Phys 115 - Assignment Question”
  - Always address recipient courteously, e.g., “Hi Amir,”
  - Always include your name, student number, and course name & section in your email.
  - Use full sentences and describe your question or situation completely and clearly. Be concise.
  - Re-read your complete message before sending (especially if you are upset about something!).

## Course Content

- Lecture 1, September 11

- 1.1 Standards of Length, Mass, and Time
- 1.2 The Building Blocks of Matter
- 1.3 Dimensional Analysis
- 1.4 Uncertainty in Measurements and Significant Figures
- 1.5 Unit Conversions for Physical Quantities
- 1.7 Coordinate systems
- 1.8 Trigonometry Review
- 1.9 Vectors
- 1.10 Components of a Vector
- 1.11 Problem-Solving Strategy
- 2.1 Displacement, Velocity, and Acceleration
- 2.2 Motion Diagrams

- Lecture 2, September 18

- 2.3 One-Dimensional Motion with Constant Acceleration
- 2.4 Free Falling Objects
- 3.2 Two-Dimensional Motion

- Lecture 3, September 25

- 4.1 Forces
- 4.2 The laws of Motion – Part 1
- 4.2 The laws of Motion – Part 2
- 4.3 The normal and Kinetic Friction Forces
- 4.4 Static Friction Forces
- 4.5 Tension Forces
- 4.6 Applications of Newton's Laws
- 4.7 Two-Body Problems

- Lecture 4, October 2

- 5.1 Work
- 5.2 Kinetic Energy and the Work-Energy Theorem
- 5.4 Gravity and non-Conservative Forces
- 5.5 Spring Potential Energy
- 5.6 Systems and Energy Conservations
- 5.7 Power

- Lecture 5, October 16

- 6.1 Momentum and Impulse
- 6.2 Conservation of Momentum
- 6.3 Collisions in One Dimension
- 6.4 Glancing Collisions

- Lecture 6, October 23

- 7.1 Angular Velocity and Angular Acceleration
- 7.2 Rotational Motion Under Constant Acceleration, and Centripetal Acceleration
- 7.3 Tangential Velocity, Tangential Acceleration
- 7.4 Newton's Second Law for Uniform Circular motion
- 7.5 Newtonian Gravitation

- Lecture 7, October 30

- 8.1 Torque
- 8.3 Torque and two Conditions for Equilibrium
- 8.4 The Rotational Second Law of Motion

- Lecture 8, November 13

8.5 Rotational Kinetic Energy

8.6 Angular momentum

15.1 Electric Charges, Insulators, and Conductors

15.2 Coulomb's Law

15.3 Electric Fields

- Lecture 9, November 20

15.4 Electric field Lines

16.1 Electric Potential Energy and Electric Potential

16.2 Electric Potential and potential Energy of Point Charges

16.3.2 Equipotential Surfaces

- Lecture 10, November 27

17.1 Electric Current

17.2 A Microscopic View: Current and Drift Speed

17.3 Current and Voltage Measurements in Circuits

17.4 Resistance, Resistivity, and Ohm's Law

17.5 Temperature Variation of Resistance

17.6 Electric Energy and Power

18.1 Sources of emf

- Lecture 11, December 4

18.2 Resistors in Series

18.3 Resistors in Parallel

19.1 Magnets

19.2 Earth's Magnetic Field

19.3 Magnetic Fields

19.4 Motion of a Charged Particles in a Magnetic Field

## **Labatorials**

Labatorials are an amalgam of tutorials and practical work in the laboratory. The labatorials are designed to illustrate aspects of the course material, help you develop your problem-solving skills, and introduce you to experimental science. Each labatorial module spans two weeks and will consist of a tutorial in the first week (worth 3 marks), a short WebAssign pre-lab test (worth 3 marks), an experimental investigation in the second week (worth 6 marks), and a short WebAssign post-lab test (worth 3 marks). More details will be provided in the first lab tutorial.

## Physics 115 Laboratorial Policy

1. Laboratorial work is an integral part of the course and you are expected to complete all the laboratorial work. Opportunities to complete the experimental portion of the laboratorial work will be provided for students who are absent for legitimate reasons (e.g. illness, etc.). A mark of zero will be assigned to laboratorial work that is not completed by the end of classes.
2. Withdrawing from Physics 115 implies withdrawing from the laboratorial work in the course as well. You may not continue laboratorial work after withdrawing from the course, even if you decide to continue to attend the lectures.
3. If you complete Physics 115 with a final grade of 40% or higher and complete the laboratorial work with an average laboratorial mark of at least 70%, and you then repeat the course in a later session within three years, you may request exemption from the laboratorial work. Your laboratorial mark for the year will be the laboratorial mark that you previously achieved.
4. If you complete Physics 115 with a final grade of less than 40%, **no** laboratorial exemption will be granted.

### Lab Schedule

Lab	Date	Time	Room
M3	Sep 25, Oct 2	3:30 PM	13
M36	Oct 16, Oct 23	3:30 PM	13
M39	Oct 30, Nov 13	3:30 PM	13
E7	Nov 20, Nov 27	3:30 PM	13