

## Course Syllabus

PC131/151 Mechanics

Department of Physics and Computer Science, Faculty of Science, Waterloo Campus

Fall | Year 2019

### Instructor Information

Marek S. Wartak | Office N 2076 D

Contact Information (x. 2436/mwartak@wlu.ca)

Weekly Office Hours (M 2:00 -3:00 pm) or by appointment

### Course Information

Calculus-based course, which introduces basic principles of physics. Detailed topics covered: one-dimensional motion, vectors, motion in two and three dimensions, force and motion, kinetic energy and work, potential energy, conservation of energy, center of mass, linear momentum, rotational motion, torque and angular momentum.

Credit: 0.50

Prerequisite: OAC or Grade 12U Physics or Advanced Functions and Introductory Calculus

Co-requisite: MA110\* or MA103 or MA105

Exclusion: PC100\*, PC110\*, PC141, PC151, PC161, SC100

Course location: MWF 11:30-12:20 pm in BA110

### Course Overview and Approach

The goal of PC131/151 is to provide students with the basic concepts of physics using calculus. We not only tell students how physics works, we show them, and we give them the opportunity to show us what they have learned by testing their understanding of the concepts and applying them to real-world scenarios.

The course is structured in terms of thematic units which will help students study in a fair detail and understand the most important aspects of mechanics of bodies. The course is lecture based. During each class students will be able to ask questions if they need more clarification. After the lecture I would expect students to have at least basic understanding of the most important parts of the topics discussed.

### Course Goals and Learning Outcomes

*Required math:* basic calculus, algebra and trigonometry. Most of the subject matter will be developed using techniques of differential calculus, but on occasion integration will be included. Functions that students will differentiate and integrate are mostly polynomials.

After taking this course you will, among other things, be able to

- understand basic concepts of classical physics
- be able to solve some of real-life problems

## Course Tools and Learning Materials

Principal course textbook is:

- J. Walker, Halliday, Resnick, Fundamentals of Physics, 10-th Edition, Wiley 2018.
- WileyPLUS will be used to submit online assignments. Can be obtained from the bookstore with the textbook.

Students can register for WileyPLUS by going to <https://edugen.wileyplus.com/edugen/class/cls649884/>

## Student Evaluation for PC131

<b>Assessment</b>	<b>Weighting</b>
11 Assignments	25%
Labs	20%
Midterm	20%
Final Exam (comprehensive)	35%
<b>Total</b>	<b>100%</b>

## Student Evaluation for PC151

<b>Assessment</b>	<b>Weighting</b>
11 Assignments	25%
Midterm	30%
Final Exam (comprehensive)	45%
<b>Total</b>	<b>100%</b>

## Notes

- The course will use WileyPLUS online system to administer the assignments. If you purchased a new copy of the textbook from the bookstore, it will include an access code. We will discuss WileyPLUS registration on the first day of class. If you do not purchase the text book, or if you purchased a used copy without the access code, you must purchase an access code online. All students must register with WileyPLUS.
- WileyPLUS also contains many demo animations and videos. Students are encouraged to make use of these resources.

## Tentative Weekly Schedule

Week # and dates	Topic	Lesson outcomes and learning activities
Sept. 6, 2019	General info	Discussion of syllabus
Week 1. Sept.9-Sept.13	Measurement	Measurement of physical quantities
Week 2. Sept.16-Sept.20	Motion along a straight line	Describing straight-line motion using ideas of displacement, velocity and acceleration.
Week 3. Sept.23-Sept.27	Vectors	Use of vectors
Week 4. Sept.30-Oct.4	Motion in 2D and 3D	Arbitrary motion
Week Oct.7-Oct.11	Force and motion - I	Newton's first and second law
Week 5 Oct.14-Oct.18	Reading Week	No classes
Week 6. Oct.21-Oct.25	Force and motion - II	Friction
Week 7. Oct.28-Nov. 1	Kinetic energy and work	Concept of work and kinetic energy
Week 8. Nov.4-Nov. 8	Potential energy and conservation of energy	Potential energy, elastic potential energy, conservative and nonconservative forces.
Week 9. Nov.11-Nov. 15	Center of mass and linear momentum	Concept of center of mass.
Week 10. Nov.18-Nov. 22	Rotation	Rotational variables, angular coordinate, angular velocity, angular acceleration
Week 11. Nov.25-Nov. 29	Rolling, torque and angular momentum	Torque. Analysis of rotational motion
Week 12. Dec.2-Dec. 4	Review	

### University and Course Policies (proposed and required text)

Laurier has several senate approved policy statements it requires instructors to include in their syllabus. Those with specific wording approved by senate are indicated specifically below.

- 1. Academic Calendars:** Students are encouraged to review the [Academic Calendar](#) for information regarding all important dates, deadlines, and services available on campus.
- 2. Special Needs:** Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources.
- 3. Plagiarism:** The University has approved the following wording for inclusion on all course syllabi about the use of the institutionally supported plagiarism software tool. "Wilfrid Laurier University uses software that can check for plagiarism. If requested to do so by the instructor, students are required to submit their written work in electronic form and have it checked for plagiarism." (Approved by Senate May 14, 2002) .

In addition to the statement above you may wish to add the following text about academic integrity.

- 4. Academic Integrity:** Laurier is committed to a culture of integrity within and beyond the classroom. This culture values trustworthiness (i.e., honesty, integrity, reliability), fairness, caring, respect, responsibility and citizenship. Together, we have a shared responsibility to

uphold this culture in our academic and nonacademic behaviour. The University has a defined policy with respect to academic misconduct. As a Laurier student you are responsible for familiarizing yourself with this policy and the accompanying penalty guidelines, some of which may appear on your transcript if there is a finding of misconduct. The relevant policy can be found at Laurier's [academic integrity](#) website along with resources to educate and support you in upholding a culture of integrity. Ignorance is not a defense.

5. **Classroom Use of Electronic Devices:** State your classroom practice and any consequences for student failure to comply – see [Policy 9.3](#) (Approved by Senate March 8, 2012).
6. **Late Assignment Policy:** Specify any penalties that will be assessed when deadlines for the completion of course components are not met (Approved by Senate May 23, 2012). Refer to the Handbook on Undergraduate Course Management for more information.
7. **Final Examinations:** Students are strongly urged not to make any commitments (i.e., vacation) during the examination period. Students are required to be available for examinations during the examination periods of all terms in which they register. Refer to the Handbook on Undergraduate Course Management for more information.
8. **Foot Patrol, the Wellness Centre, and the Student Food Bank:** The University approved the inclusion of information about select wellness and safety services and supports on campus in the course information provided to students. (Approved by Senate November 28, 2011.) Specific language (by campus) is provided below.

**Multi-campus Resource:**

- Good2Talk is a postsecondary school helpline that provides free, professional and confidential counselling support for students in Ontario. Call 1-866-925-5454 or through 2-1-1. Available 24-7.

**Kitchener/Waterloo Resources:**

- [Waterloo Student Food Bank](#): All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.
- [Waterloo Foot Patrol](#): 519.886.FOOT (3668). A volunteer operated safe-walk program, available Fall and Winter daily from 6:30 pm to 3 am. Teams of two are assigned to escort students to and from campus by foot or by van.
- [Waterloo Student Wellness Centre](#): 519-884-0710, x3146. The Centre supports the physical, emotional, and mental health needs of students. Located on the 2<sup>nd</sup> floor of the Student Services Building, booked and same-day appointments are available Mondays and Wednesdays from 8:30 am to 7:30 pm, and Tuesdays, Thursdays and Fridays from 8:30 am to 4:15 pm. Contact the Centre at x3146, [wellness@wlu.ca](mailto:wellness@wlu.ca) or @LaurierWellness. After hours crisis support available 24/7. Call 1-844-437-3247 (HERE247).

**Brantford Resources:**

- [Brantford Student Food Bank](#): All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.
- [Brantford Foot Patrol](#): 519-751-PTRL (7875). A volunteer operated safe-walk program, available Fall and Winter, Monday through Thursday from 6:30 pm to 1 am; Friday through Sunday 6:30 pm to 11 pm. Teams of two are assigned to escort students to and from campus by foot or by van.
- [Brantford Wellness Centre](#): 519-756-8228, x5803. Students have access to support for all their physical, emotional, and mental health needs at the Wellness Centre. Location: Student Centre, 2nd floor. Hours: 8:30 am to 4:15 pm Monday through Friday. After hours crisis support available 24/7. Call 1-884-437-3247 (HERE247).