

SCIENCE IN THE MODERN WORLD



The College of the Humanities (Humanities Program) - HUMS 4103 Syllabus – Winter 2018

“An appreciation of what is happening in science today, and of how great a distance lies ahead for exploring, ought to be one of the rewards of a liberal arts education. It ought to be a good in itself, not something to be acquired on the way to a professional career but part of the cast of thought needed for getting into the kind of century that is now just down the road. Part of the intellectual equipment of an educated person, however his or her time is to be spent, ought to be a feel for the queerness of nature, the inexplicable things.”

- Lewis Thomas

Calendar Description

HUMS 4103 [0.5 credit]

Science in the Modern World

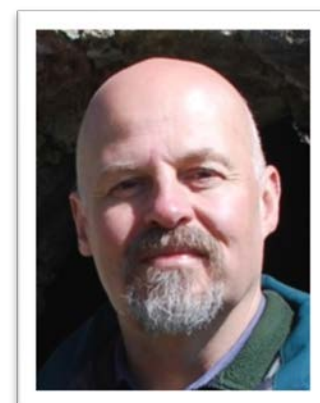
An introduction to the major scientific ideas of our time (such as Big Bang theory, molecular genetics, evolution, atomic structure), and the impact of technology on society (e.g. global warming, pollution, genetically modified foods, viral infections). Precludes additional credit for HUMS 4100 (no longer offered). Prerequisite(s): restricted to students in the Bachelor of Humanities program. Lectures three hours a week.

Purpose of the Course

During the last few centuries, scientific knowledge and technology have drastically transformed our world. Yet basic questions remain. How is scientific knowledge produced? What makes science different from other ways of learning about the world? What does science say about reality? Is there a sharp divide between science and non-science? We will reflect on the nature of science and how it affects our lives, and consider the relationships between science and the humanities. We will also examine the roles that science plays in a democratic society, and how citizens should think about scientific research. In addition to exposing students to modern science and its relevance to contemporary life, this course also aims to develop students' abilities to evaluate complex scientific ideas and arguments.

Contact Information

Professor: James J. Cheetham, Ph.D.
Department of Biology
Office: CTTC 4615 (Carleton Technology Training Centre)
Office hours: Wednesdays (2:00 pm - 4:00 pm), or by appointment.
Phone: 520-2600 Ext. 3867 (email is best).
E-mail: james_cheetham@carleton.ca



Course Materials

Lectures: Wednesday evenings – 6:00 pm to 9:00 pm.
Place: College of Humanities Lecture Room.
cuLearn: This course has lots of cuLearn content.
Textbook: No official textbook for this course.
There are, however, readings on the cuLearn pages.
Schedule: On the cuLearn page.



Prerequisites

This course is limited to students in the Bachelor of Humanities programs. Curiosity about the natural world, and an open mind are also valuable assets.

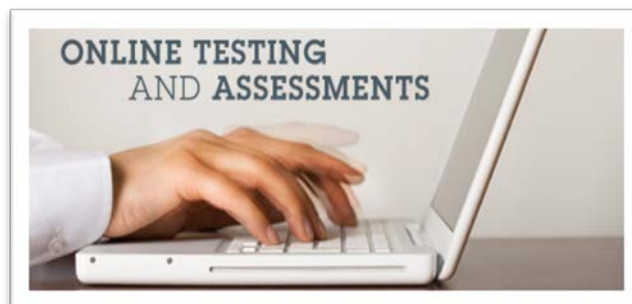
Office Hours

Office hours are Wednesdays from 2:00 pm to 4:00 pm at my office (CTTC 4615). Feel free to send me questions by email or better yet, post them in the cuLearn Forum. You can also schedule an appointment by sending me an email, or talking to me in person.

Assessment

Students are responsible for, and may be tested on, all the material discussed during all lectures (including guest lectures), and discussion sessions. Also all required reading and video materials, whether covered in lecture or not are fair game. There will be a total of 100 marks from the tests, assignments, and participation.

Assignments	30% (2 x 15% each)
Tests	30% (3 x 10% each)
Grant Proposal	30%
Participation	10%
Total	100%



Assignments

All Assignments in this course should be formatted and documented following Chicago style. If you have any questions about how to document a source after checking the Chicago handbook please ask me, preferably in the Forums so other students can benefit as well, but of course by email at any time All papers should be 12 pt. font double-spaced from top to bottom without interruption or extra line spaces, with 1" margins all around. Properly setting up your paper counts toward part of your mark on the assignment (**see the Assignment Rubrics**).

cuLearn Tests

The tests during the term will be conducted **online** using cuLearn, and will consist of multiple choice questions, with a few short answer, fill-in-the-blanks, and matching questions.

Students are expected to take the tests during the scheduled times. Each test will be available during a 24 hour window (from 12:01 am on the test day, until 11:59 pm on the test day). Once you start the test, you will have **ONE HOUR** to finish it. You do not get multiple attempts. There are **THREE** cuLearn tests during the term. **There are no make up tests.**

There is a sample quiz on the Quiz Page in cuLearn. I suggest you do this sample quiz before the first REAL quiz to make sure you understand how the online quizzes work.

Attendance and Participation

Your attendance at the lectures is required and your participation in class, and in the forums will be assessed by the instructor. Despite what Woody Allen says, participation does **NOT** mean just showing up. **See the Participation Rubric.**

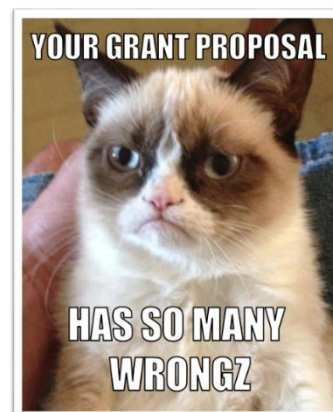
Some suggested ways to participate:

- Ask questions in class and during guest lectures.
- Contribute interesting articles, comments analysis and opinions to the cuLearn Forums.
- Be active and contribute ideas during discussions.
- Be prepared for class.

Grant Proposal

One way to understand science is to do what scientists do, and one thing that scientists do is write grants. Therefore, you are required to write a Grant Proposal for research on a scientific problem. You can transcend the arts and sciences in your proposal, but make sure to get approval of your topic from me in the first month of class.

The objectives for the proposal are first, to learn how science is used to formulate and solve problems, second to hone your academic writing skills, which include construction of a logical and persuasive argument. The proposal will evaluate your knowledge base, ability to ask good questions, formulate hypotheses, propose experiments, and also your ability to integrate and synthesize information and develop a logical argument.



Reading and Video Materials

Slides used in class and links to the readings and videos for the course are available on the cuLearn pages. I suggest you scan the available material before the lectures, and then read it again, after the lectures. You will spend a lot of time reading. There are also videos to help you learn about science and technology. I suggest you watch them, they will help you.

See the Lecture Schedule for details on lectures topics, readings, test dates, and assignment due dates.

Keep up with the readings and the videos. I cannot stress this enough.

Electronic Communication

cuLearn

Use of cuLearn is required for HUMS 4103. You may access it at any of the computer labs on campus or on your own computer with an internet connection. Access the HUMS 4103 cuLearn course page to see: lecture slides, readings, tutorials, videos, class announcements, assignments, quizzes, tests, the glossary, or to view your grades. Check out the resources for how to succeed in this class. The Course Webpage will be updated as needed during the term.

You may need to download plug-ins so you can view the tutorials I have included in this course. For help and support, go to carleton.ca/cuLearnsupport/students. Any unresolved questions can be directed to Computing and Communication Services (CCS) by phone at 613-520-3700 or via email at ccs_service_desk@carleton.ca.

emails

I receive many emails every day, so do not despair if you don't get a reply right away. I can usually reply within 24 hours. You all have a Carleton email addresses by virtue of enrolling at Carleton. Any questions about grades, etc., must come from your Carleton account, this is university policy, so some hacker cannot send an email from a Gmail account and find out your grades.

Please send me an email at: james_cheetham@carleton.ca and I will respond, so we know that our electronic communication is working, and your emails are not going into my junk folder. This is also a way for me to check if you have read, at least this far, in the syllabus.

Academic Accommodation

<http://www2.carleton.ca/equity/accommodation/academic>

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the [Student Guide](#)

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the [Student Guide](#)

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Academic Regulations

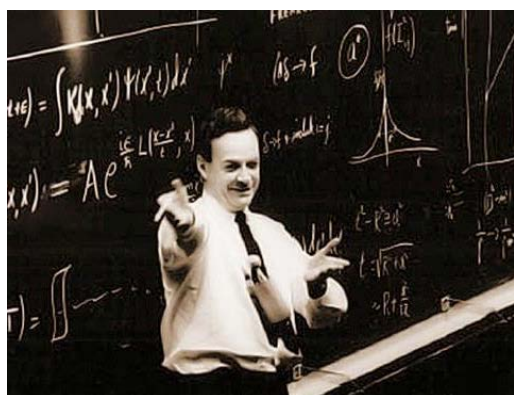
<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity>

Carleton University is committed to ensuring fairness and consistency in the completion of assignments, and examinations. As part of this commitment, students are required to follow proper assignment and examination procedures. A student who commits a violation of this policy on an examination or assignment, or obtains or produces an answer or unfair advantage by deceit, fraud, or trickery, or by an act contrary to the rules of the assignment or examination are subject to the sanction under this Policy. You are expected to follow the Academic Regulations of the University. In particular, **pay attention to the section on Student Conduct**. If you are not sure about the definition of cheating, come and see me, and I will explain it to you in more detail.

About HUMS 4103

Science and technology are pervasive in the modern world. Science has become an integral part of human cultures and arguably, the single most widely-accepted authority for public decision-making. Indeed, technology: the tools and the practical application of scientific knowledge, has always been an essential feature of human society. We cannot escape science and technology and their importance to our everyday lives. As a result, it is essential for us to better understand science and technology. In this course, we will examine how science and technology have shaped the modern world, and how society and culture have shaped the production and consumption of science and technology throughout history. This course will challenge you to think about the world in new and sometimes unorthodox ways, and to find links between different sciences, and between science and other disciplines.

Students studying science often feel like they are **learning a new language**. The best way to learn complex disciplines is to become an active participant in them. How can that be achieved in this course? First, try teaching other people about what you learn and explain concepts to them. The most satisfying proof of mastering a difficult topic is the ability to explain it to another person. It is expected that you will work with other students outside the classroom in preparation for lectures and tests. Another way to become actively engaged in the study of science is to take full advantage of the Forums on cuLearn.



So I find that teaching and the students keep life going, and I would never accept any position in which somebody has invented a happy situation for me where I don't have to teach. Never.

— Richard P. Feynman

How to take this course

It's not what you "get" in this course, it's how deep you go. People study science for lots of reasons, usually variations on "it's required." Think about why someone has decided that learning this material might be essential to your university experience, and what that means for you personally.

It is entirely possible to do well in the class without being transformed by your newfound scientific knowledge, but it would be a shame. I like to think that this (and indeed, any) course operates on three levels. Imagine we are standing on the seashore; the course is the ocean. Enter with me and go as deep as you dare...

Wading

You need the basic outlines of science, the highlights, the main characters & ideas, the surface-level knowledge.

There's nothing wrong with staying in the shallows; this approach may work for you if this is likely to be your only science course, or if you've never taken one before and it's all new.

"Waders" will tend to assume that readings and the professor are mutually reinforcing, telling basically the same story. Waders are mainly concerned with WHAT happened in science, and not why.

Snorkeling

You have a grasp of the basics and are ready to think scientifically and explore what's below the surface

Perhaps you've taken a science course before, or are a fan of science. You already know that science is a conversation among differing and/or contradictory perspectives.

"Snorkelers" notice inconsistencies and they respectfully challenge assumptions through lively debate. Snorkelers are interested in HOW & WHY things happened as they did.

Scuba-Diving

You want to go deeper into science, using the cognitive equipment & tools of science as a focused critical thinker

Experienced? You are well-aware of scientific controversies and how scientific knowledge is constructed. You actively seek alternative sources, interpretations, and voices.

"Divers" don't take any of the course's structure or content as natural or inevitable. You see (and then fill) the course's gaps. You are curious, passionate, and concerned with WHY SCIENCE MATTERS.



We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win.

**John F. Kennedy
September 12, 1962**

Learning Outcomes

To enable your learning, I list explicit Learning Outcomes. There are Learning Outcomes for the entire course, and Learning Outcomes associated with each lecture.

The Learning Outcomes are intended to increase your understanding of science and technology as an ever-developing body of knowledge, the provisional nature of scientific explanations, the complex relationship between evidence and ideas in science and the impacts of science and technology on the modern world. Course material (lectures, readings, videos, etc.) and assessments (tests, assignments) are aligned with these Learning Outcomes.



Learning Outcomes for the course are the following:

Students who successfully complete this course will be able to:

- Explain science as a way of thinking.
- Distinguish between science, pseudoscience and nonscience.
- Describe important historical events and people in the development of modern science.
- Evaluate pros and cons of new scientific discoveries and technologies.
- Effectively communicate about science and technology in writing.
- Explain the provisional nature of scientific knowledge.
- Explain the importance of the principle of tolerance in science.
- Describe some important theories and methods in modern science.
- Identify and intelligently discuss controversies and ethical issues in science and technology.
- Contribute to discussions of current scientific news items to help develop an awareness of science in the modern world.
- Develop individual interests, through assignments, that engage a scientific or technological controversy, policy problem, genetic disease, or application of science.
- Explain why your genotype does not equal your phenotype.
- Recognize and articulate the impacts of science and technology on your own life, the lives of others, the environment, society and our planet.

There are also learning outcomes associated with each lecture.

What I Expect from You

I expect you to extend your study of science and technology outside the classroom. For example, the quizzes and assignments will not only test your knowledge of the information presented in lectures, but also your synthesis of the information into a logical whole – the big picture. I expect you to consider science and technology in your other courses and to discover how ideas and concepts presented during the semester affect your health, the environment, and the world as a whole. Your success as a student depends upon your ability to think creatively and critically. Therefore, I intend to foster and expand the creative intellect already resident in your thoughts, and ***I expect you to be open to new ways of thinking and to challenge old ways of thinking.***

What You Can Expect from Me

Learning is what a student does (I cannot force you to learn). My role is to **facilitate** learning (by stating explicit **Learning Outcomes**, lecturing, answering questions, etc.) and to **assess** learning (assignments, quizzes, etc.). Remember that you are doing this work for yourself (to prepare for your future adventures), not for the instructor.

You can expect me to be prepared for class with both knowledge and enthusiasm. You can expect patient and thoughtful teaching and help both within and outside our scheduled time together. You can expect that I will utilize all reasonable resources to help you succeed in this class. Don't be afraid to seek help when needed. I am here to help you learn the material in this course and to provide an impartial evaluation of your performance. It's tough sometimes, but it's OK to ask questions in lecture, or in the Discussion Forum. Come to office hours, or make an appointment, if you have more detailed questions. Use the cuLearn Forums. Send me an email.



General Course Policies

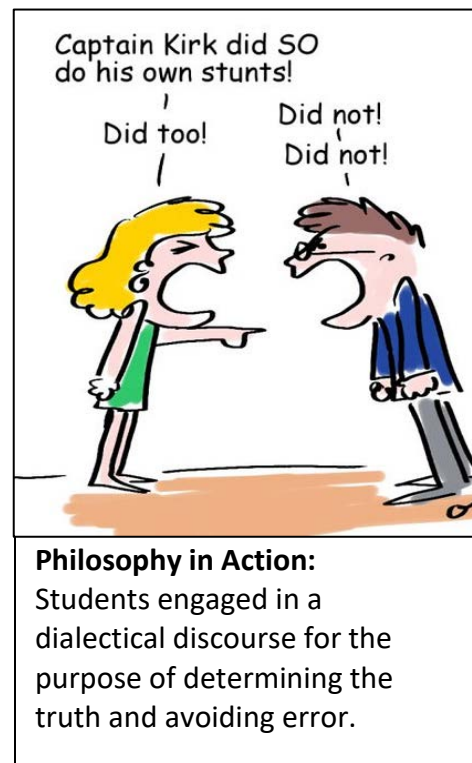
1. Your experience in this course (and in life) will be more enjoyable if you treat your classmates and your instructor with courtesy and respect (**Google “Wheaton’s Law”**).
2. When you come to class, be on time, and be prepared. If you are unavoidably late, enter the room quietly and choose a seat as quickly as possible. Do not invite your friends in to chat in this class. Disruptions in class make me very unhappy. And unhappy professors write really, really hard test questions.
3. Once in class, stay for the duration. If you must leave early, give me advance warning. You will not be allowed to meander in and out of the classroom. This is disruptive and unfair to your fellow students, and also makes me unhappy (see comment #2 above). Take care of your personal needs before class.
4. Turn off the sound on communications devices. This includes cell phones, personal entertainment (TV, music, etc.) devices or anything else that will disturb your classmates. Students with special circumstances need to speak with me right away. Do not talk on your cell phone while I am lecturing, or a guest is lecturing. (see comment #2 above about unhappy professors and extremely difficult test questions).
5. No chit-chat or unnecessary noise during lectures. If everyone is making noise, no one can hear anything. Stay focused on the material under consideration during lecture. You are paying a lot of money to be in this class. If somebody is talking near you, he or she is disrupting your learning experience, and essentially stealing your tuition money. You are not paying tuition to listen to buddy talk about his very nutritious breakfast (save that for Twitter). I suggest you ask them to shut up.
6. Academic dishonesty is not tolerated. If you are unclear about what is dishonest, please see the Undergraduate Calendar for clarification. If you are still unsure about specific instructions, ask me. Science is a collaborative endeavor. Therefore, you are encouraged to work together as much as possible. However, tests are not collaborative and must be completed without the assistance of other people.



Forum Discussion Guidelines

Source: Howard Gabennesch, (1992) The Teaching Professor, 6(9).

1. Try to make comments that connect ideas from the course with phenomena outside the classroom, and between ideas in one part of the course and those in a different part.
2. Avoid war stories, rambling speeches heavily punctuated with the word "I," and raw opinions that we could just as easily get from the average patron at the nearest pub, who has never heard of this course and its assigned reading.
3. Realize that when our emotions are aroused our brain wants to take orders from them. It is essential; therefore, to be willing to disconnect one's brain from one's gut long enough to render due process to ideas, particularly those that are unpopular or personally distasteful. This is an unnatural act, and requires courage. You will probably find it easier to join lynch mobs from time to time.
4. Understand that the right to have an opinion does not include the right to have it taken seriously by others. Nor is having an opinion necessarily laudable in itself. An opinion is only as good as the evidence, theory, and logic on which it is based.
5. Be careful about basing your opinions uncritically on the testimony of experts. Experts are subject to error and bias. They often disagree with other experts. All of this applies to the authors of your texts and your professors.
6. Beware of the tendency to view questions in dichotomous terms, such as either-or, all-or-none. The world is a complex, messy place where absolute answers are hard to find, gray is more common than black and white and contradictory things are often in the same package. **(Watch the Jacob Bronowski video).**
7. Value tentativeness. It's OK to admit you're unsure. It's OK to change your mind. **(Watch the Jacob Bronowski video, again).**



Winter Term 2018 – Important Dates and Deadlines

<u>Date</u>	<u>Activity</u>
January 2	University reopens at 8:30 a.m.
January 8	Winter term classes begin.
January 19	Last day for registration for winter term courses. Last day to change courses or sections for winter term courses.
January 31	Last day for a fee adjustment when withdrawing from Winter term courses or the Winter portion of two-term courses (financial withdrawal).
February 16	April examination schedule available online.
February 19	Statutory holiday, University closed.
February 19-23	Winter Break. Classes are suspended.
March 1	Last day for receipt of applications from potential spring (June) graduates. Last day for receipt of applications for admission to an undergraduate program for the summer term.
March 9	Last day to request formal exam accommodations for April examinations to the Paul Menton Centre for Students with Disabilities.
March 27	Last day for summative or final examinations in winter term or fall/winter courses before the official examination period.
March 30	Statutory holiday, University closed.
April 11	Winter term ends. Last day of fall/winter and winter-term classes. Classes follow a Friday schedule. Last day for academic withdrawal from fall/winter and winter term courses.
April 12-13	No classes or examinations take place.
April 14-26	Final examinations in winter term and fall/winter courses may be held. Examinations are normally held all 7 days of the week.
April 26	All take home examinations are due on this day.





Humanities

University Regulations for All Humanities Courses

Copies of Written Work Submitted

Always retain for yourself a copy of all essays, term papers, written assignments or take-home tests submitted in your courses.

Academic Integrity at Carleton

Plagiarism is presenting, whether intentionally or not, the ideas, expression of ideas, or work of others as one's own. Plagiarism includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, art works, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, and material on the internet. More information can be found on <https://carleton.ca/registrar/academic-integrity/#AIatCU>.

Academic Accommodation Policy

Academic Accommodation

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613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Grading System at Carleton University

Standing in a course is determined by the course instructor, subject to the approval of the faculty Dean. Standing in courses will be shown by alphabetical grades. The system of grades used, with corresponding grade points and the percentage conversion is below. Grade points indicated are for courses with 1.0 credit value. Where the course credit is greater or less than one credit, the grade points are adjusted proportionately.

[Grading System Chart](#)

Course Sharing Websites and Copyright

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

Statement on Class Conduct

The Carleton University Human Rights Policies and Procedures affirm that all members of the University community share a responsibility to:

- promote equity and fairness,
- respect and value diversity,
- prevent discrimination and harassment, and

preserve the freedom of its members to carry out responsibly their scholarly work without threat of interference.

Deferred Term Work

In some situations, students are unable to complete term work because of illness or other circumstances beyond their control, which forces them to delay submission of the work.

Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and **in all cases this must occur no later than three (3.0) working days after the term work was due.**

The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Normally, any deferred term work will be completed by the last day of term. More information is available [in the calendar](#).

Deferred Exams

Students who do not write/attend a final examination because of illness or other circumstances beyond their control may apply to write a deferred examination.

1. be made in writing to the Registrar's Office **no later than three working days after the original final examination or the due date of the take-home examination;** and
2. be fully supported by appropriate documentation and in cases of illness by a medical certificate dated no later than one working day after the examination or by appropriate documents in other cases. Medical documents must specify the date of the onset of the illness, the (expected) date of recovery, and the extent to which the student was/is incapacitated during the time of the examination. The University's preferred medical form can be found at the Registrar's Office [forms and fees page](#).

The granting of a deferral also requires that the student has performed satisfactorily in the course according to the evaluation scheme established in the Course Outline, excluding the final examination for which deferral privileges are requested. Reasons for denial of a deferral may include, among other conditions, a failure to (i) achieve a minimum score in the course before the final examination; (ii) attend a minimum number of classes; (iii) successfully complete a specific task (e.g. term paper, critical report, group project, computer or other assignment); (iv) complete laboratory work; (v) successfully complete one or more midterms; or (vi) meet other reasonable conditions of successful performance.

More information can be found [in the calendar](#).

Any questions related to deferring a Final Exam or Final Assignment/Take Home Examination should be directed to: [Registrar's Office](#)

Withdrawal From Courses

Withdrawn. No academic credit, no impact on the CGPA.

NEW FALL 2017: WDN is a permanent notation that appears on the official transcript for students who withdraw after the full fee adjustment date in each term. Students may withdraw on or before the last day of classes.

Dates can be found here: <http://calendar.carleton.ca/academicyear/>

Department Contact Information

College of the Humanities 300 Paterson Hall (613)520-2809

CollegeOfHumanities@cunet.carleton.ca

Drop box for CLCV, HUMS LATN GREK Term Papers and assignments is outside 300 P.A.

Greek and Roman Studies 300 Paterson Hall (613)520-2809

GreekAndRomanStudies@cunet.carleton.ca

Drop Box is outside of 300 P.A.

Religion 2A39 Paterson Hall (613)520-2100

Religion@cunet.carleton.ca

Drop box for RELI Term Papers and assignments is outside of 2A39 P.A.

Registrar's Office 300 Tory (613)520-3500

<https://carleton.ca/registrar/>

Student Resources on Campus

[CUKnowHow Website](#)