

Division of Natural Science

<http://natsci.info.yorku.ca/>

Course Outline

**NATS 1570M 3.00 Exploring the solar system W2108**

**TR 14.30-16.00 Lassonde C**

**Course Instructor and Contact Information**

Instructor : M.H. Armour

Course Email : [natclass@yorku.ca](mailto:natclass@yorku.ca)

*Course Credit Exclusion:*

SC/NATS 1740 6.00, SC/NATS 1880 6.00, SC/NATS 1750 6.00. **NCR Note:** No credit will be retained if this course is taken after the successful completion of SC/PHYS 1070 3.00. Not open to any students enrolled in the Astronomy Stream.

**Email Policies and Etiquette**

When emailing please use your yorku mail account, other email addresses will be spam filtered out. Students should also clearly identify themselves and indicate specifically which course they are taking. Please remember to put a clear indication of the issue in the subject line. Blank subject lines are also often blocked by spam filters, as are subject lines with text such as 'Hi'.

Remember you know who you are addressing, but there are ~ 300 students in this course so you need to be clear as to who you are and what you are asking in any emails.

This course will use MOODLE for all course activities please make sure you can access the MOODLE.

Course Director : M.H. Armour

Office : 152 Chemistry Building

Office hours : By prior arrangement with professor

## **Expanded Course Description**

This course will use the Solar System to teach students about the structure of planets, the nature of the sun, the evolution of the Solar system, the dynamic processes within the Solar System, and the application of technology and the scientific method for answering questions about it.

We will look at some basic geological principles. This will include the rock cycle and its various elements – igneous, sedimentary and metamorphic process. We will also look at the basic plate tectonic structure and mechanisms, how sedimentary rock is formed and how metamorphic processes affect rock. This will include a brief look at the techniques used by geologists work to figure out these structures. This will include looking at and gaining a basic ability to use such techniques as radioactive dating.

We will look at atmosphere and hydrosphere composition. We will look at how convection, and the coriolis force as well as the energy from the sun drive the processes in the atmosphere and hydrosphere.

We will then use this knowledge to compare to the other planets.

We will look at the structure of the other planets in our solar system

(Mercury, Venus, Mars, Jupiter, Saturn, Uranus Neptune) - and compare them to the template we have developed in studying Earth.

We will see how the other planets have developed over time in ways that are distinctly different from Earth. This will include looking at results from recent probes like MESSENGER, Venus Express and the many Mars missions in the last decade, but particularly Spirit and Opportunity and the Phoenix mission (to which faculty at York contributed), as well as the result from the current Curiosity mission.

We will look at how the solar system is divided into two distinctly different groups of planets – the inner and outer planets. We will examine what the differences are between these two distinct groups. This knowledge will later be incorporated into our understanding of how our solar system formed.

We will also study the various moons – particularly some of the large satellites of Jupiter and Saturn (Io, Europa and Titan). These objects are comparable in size to the rocky inner planets and have many features in common, but also some notable differences. In particular we will look at how being it close proximity to a large planet affects these objects. Io is the most volcanically active object in our solar system and this is a direct result of the gravitational effects of being so close to Jupiter.

We will have an overview of the smaller solar system objects that form our solar system – comets, asteroids and dwarf planets. Students will learn what the basic composition and behaviour of these objects is.

We will examine how all the different types of objects fit into a larger picture and use this to see how we have developed a model of how we think the solar system formed.

We will look at how the IAU (International Astronomical Union) defined a planet in 2006 and how this relates to all the different objects we have seen.

Throughout the course we will look at how certain basic principles of physics and chemistry (like the role of temperature in many processes) comes into play in many different situations.

### Course Learning Outcomes

Upon Successful completion of this course students should be able to:

1. Students will be expected to learn the basic structure of Earth and the processes that occur in the body of the planet, hydrosphere and atmosphere. This will include using some basic graphical and statistical techniques to study Earth (such as various techniques for dating rock layers)
2. Students will be expected to know what the basic features of the different planets are and how they compare to Earth. Key here is the process of contrasting and comparing which allows us to learn about the different objects in our solar system, but also gives us a better understanding of Earth in seeing how different geological systems have behaved over time.
3. Students will be expected to understand some of the processes that have shaped the bodies in solar system including various moons, asteroids and comets. This will include looking at what gravity is and how it has shaped our solar system.
4. Students will look at how there are two distinctly different groups of planets as well as many other objects within our solar system and how this relates to the structure of our solar system.
5. Students will be expected to learn how we think our solar systems formed and how the orbital and other characteristics of the bodies of our solar system fit in with this model

### **Evaluation:**

Assignments – 40%

Midterm 15%

Final exam – 35% (during exam period date set by the Registrar’s office)  
Active Learning- 10% (using iclicker and/or other classroom based activities)

### **Required Course Material**

E-book version of Earth Science by Marshak and Rauber.  
If you buy somewhere other than the bookstore please be sure to have the Smartworks 5 package included as this is required for the course.

This course will also use iclicker see  
<http://lts.info.yorku.ca/polling-student/> for required app.

### **Laboratory/Tutorial**

This course does not have a laboratory or tutorial component

### **Course Content and format**

This course is presented through bi-weekly lectures. All course material will be posted on MOODLE.

### **Math Content**

Math content is consistent with expectation of Ontario Grade 10 Math

### **Course Policies**

#### *Late Material or Missed Exams and Tests*

Due Dates are **NOT** negotiable – ,late material will NOT be accepted. For missed exams or other work or due dates, documentation will be required as proof of the legitimacy of the reason. Notification of such absences must normally be within **48 hours** (email is the preferred form of notification) and documentation would normally be submitted within **1 week** of the missed date or no accommodation will be considered. If you know in advance that you have a conflict for the dates for any work or exams, etc. please notify the professor at least **2 WEEKS** in advance so other arrangements can be made, this includes any religious exemptions. Please see York’s webpage for the guidelines for religious exemptions. These policies will be STRICTLY enforced.

#### *Submission of Work*

Any submission of the work is to take place ***only*** through MOODLE by the deadlines indicated. For work submitted on MOODLE, it is the student’s responsibility to make sure the assignment has been submitted properly. Late material will NOT be accepted.

#### *Plagiarism and Academic Dishonesty*

Any material submitted by a student for this course must be original unless otherwise acknowledged. Collaboration with colleagues on a problem is an essential part of science, but to claim credit for work performed by others is both unethical and unacceptable. Assignments should be your own work NOT a group effort. **NOTE:** *this course uses clickers.. it is considered a breach of academic honesty to use anyone's clicker but your own to enter answers. If you are found entering answers for anyone else but yourself, both the person in class and the person to whom the clicker is registered will at minimum receive a penalty of zero for the entire participation mark.*

Plagiarism and cheating in any form will not be tolerated. The penalty for such offences range from a failing grade on the submitted material to expulsion from the University.

**Please see the following link for more details as to York's academic integrity policy given in Important University Policies.**

## **Important University Policies**

### **Important Sessional Dates**

Includes sessional start and end dates, drop deadlines, and withdrawal dates.

See the Office of the Registrar website at <http://www.registrar.yorku.ca/enrol/dates/>

### **Academic Honesty and Integrity**

Academic honesty requires that persons do not falsely claim credit for the ideas, writing or other intellectual property of others, either by presenting such works as their own or through impersonation. Similarly, academic honesty requires that persons do not cheat (attempt to gain an improper advantage in an academic evaluation), nor attempt or actually alter, suppress, falsify or fabricate any research data or results, official academic record, application or document. Finally, academic honesty requires that persons do not aid or abet others to commit an offence of academic dishonesty, including intentional acts to disrupt academic activities.

Suspected breaches of academic honesty will be investigated and charges shall be laid if reasonable and probable grounds exist.

#### Academic Honesty and electronic devices during assessments (e.g. exams)

- Internet capable and personal storage devices of all kinds must be turned off, including vibrate. These and any other unauthorized material must be placed under the student's chair and should not be accessed at any point during the exam. Failure to comply with directive may be considered a break of academic honesty.
- See <http://registrar.yorku.ca/exams/tipsheet>

Please familiarize yourself with the full Senate Policy on Academic Honesty, found at <http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>

Please also familiarize yourself with the SPARK Academic Honesty tutorial found at <https://spark.library.yorku.ca/academic-integrity-what-is-academic-integrity/>

### **Academic Accommodation for Students with Disabilities**

York University shall make reasonable and appropriate accommodations and adaptations in order to promote the ability of students with disabilities to fulfill the academic requirements of their programs.

The nature and extent of accommodations shall be consistent with and supportive of the integrity of the curriculum and of the academic standards of programs or courses.

Please familiarize yourself with the full Senate Policy on Academic Accommodations for Students with Disabilities, found at <http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/>

**Note: Students should submit accommodation letters from Counseling and Disability Services (CDS) to the course instructor within the first two weeks of the course or as soon as issued.**

Counseling and Disability Services - <http://cds.info.yorku.ca/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

**Note: A student registered with CDS, and choosing to write with Alternate Exams, is responsible for making the appropriate writing arrangements within the timeframes outlined by Alternate Exams.**

Alternate Exams - <http://altexams.students.yorku.ca/>

### **Religious Observance Accommodation**

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents.

<https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/15/wo/kmHGekTpzKLX6XYKBXYc8M/0.3.4.62.0>

**Note: Students who will have an academic conflict as a result of a religious observance, at any point in the term, should make the instructor aware of such at least three weeks prior to the conflict.**

For conflicts occurring during an official examination period, please complete the Examination Accommodation Form available at [http://www.registrar.yorku.ca/pdf/exam\\_accommodation.pdf](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf) and submit to your instructor at least three weeks prior to the final exam.

### **Student Conduct in Academic Situations**

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect and to refrain from actions disruptive to such a relationship. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. A statement of the policy and procedures regarding disruptive and/or harassing behaviour by students in academic situations is available on the website of the University Secretariat (<http://secretariat.info.yorku.ca/>).

### **Division of Natural Science Resources**

#### **NATS-AID**

Free peer tutoring for students enrolled in Natural Science Courses.

See <http://natsci.info.yorku.ca/nats-aid/>

### **M-AID in NATS (Math Aid)**

Free math help for students enrolled in Natural Science Courses (TA tutors)

See <http://natsci.info.yorku.ca/m-aid-in-nats/>

### **Other Resources**

#### **Learning Commons**

The Learning Commons brings together key supports for your learning: writing, research, learning skills and career services. <http://www.library.yorku.ca/cms/learning-commons/>

#### **goSAFE**

goSAFE is a complimentary service provided to the York Community. At the Keele campus, goSAFE has two routes: North Route & South Route which will safely transport community members by vehicle from one specified hub to another on campus. goSAFE operates seven days a week, all year round, including University closures (with the exception at Glendon during the Christmas holiday closure).

Call the goSAFE office at 416-736-5454 or extension 55454 during hours of operation. Please give your name, location and destination. <http://www.yorku.ca/goSAFE/>

#### **Mental Health and Wellness at York University**

Outlines a variety of resources available to support mental health and wellness

<http://mhw.info.yorku.ca/resources/resources-at-york/students/>

#### **Good2Talk**

Post-Secondary Student 24 hour Helpline

<http://www.good2talk.ca/> 1-866-925-5454