



COURSE OUTLINE

1. **Course:** SCIE 533, Principles of Geothermal Energy - Winter 2019

Lecture 01: MW 14:00 - 15:15 in ST 126

Instructor	Email	Phone	Office	Hours
Edwin Cey	ecey@ucalgary.ca	403 220-8393	ES 220	TBA

Course Site:

D2L: SCIE 533 L01-(Winter 2019)-Principles of Geothermal Energy

Note: Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

Engineering Energy and Environment 355.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Tutorial Work	20	
Top Hat Class Evaluations	10	
Term Project	20	
Midterm Exam	20	Tentatively Feb. 28, 2019
Final Exam	30	To be scheduled by Registrar

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	88 %	84 %	80%	75%	70 %	66 %	62%	58%	54 %	50 %

This course has a registrar scheduled final exam.

4. Missed Components Of Term Work:

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see [Section N.1](#); for more information regarding the use of statutory declaration/medical notes, see [FAQ](#)). Absences must be reported within 48 hrs.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize themselves with these regulations. See also [Section E.3](#) of the University Calendar.

All assigned work (tutorial homework, term projects) should be submitted when due. If assignments are due at the beginning of class and they are not submitted when the lecture begins, they are considered late. Only one late submission will be permitted per term, and will be subject to a late penalty of 10% per day (including weekends and holidays). Arrangements for submitting late assignments must be made with the instructor. Any student who fails to submit an assignment or similar required piece of work for legitimate reasons (e.g., illness, religious conviction) must discuss an alternative course of action with the instructor, preferable BEFORE the assigned work is due.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

Required Textbook(s):

Banks, D., *An Introduction to Thermogeology: Ground Source Heating and Cooling* 2nd Edition, Wiley-Blackwell.

The course will also draw from other textbooks as listed below. These books are available on reserve in the Gallagher Library.

- Renewable Energy: Power for a Sustainable Future, Boyle, G., 2012, 3rd edition, Oxford University Press.
- Geothermal Energy: Renewable Energy and the Environment, Glassley, W.E., 2010, CRC Press.
- Physics for Scientists and Engineers: A Strategic Approach, Knight, R.D., 2007, 2nd edition, Addison-Wesley.

Online Course Components: Course announcements, materials, and additional online resources will be provided on Desire2Learn (<https://d2l.ucalgary.ca>). Please check the D2L course site regularly, since students are responsible for ensuring they have the necessary materials for lectures, tutorials, and assignments.

We will use the Top Hat classroom response system to enhance learning in lectures throughout the term. Students will be required to have a portable electronic device such as a cellular telephone, tablet or laptop computer. Please see the instructor for accommodation requirements if you do not have one. Instructions for Top Hat registration will be given in class and on Desire2Learn. Your grade (as indicated above) will include a component related to in-class Top Hat evaluations.

7. Examination Policy:

All exams will be closed book. Only writing instruments, rulers and non-programmable calculators will be permitted on exams. No other aids will be allowed. An instructor-prepared equation sheet will be provided.

Students should also read the Calendar, [Section G](#), on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

Students are expected to submit high quality work. In all cases, quality work must be well organized, clearly written and presented, and have all information sources properly noted. Where applicable, questions should be labelled and in order, all tables and diagrams properly labelled, assumptions clearly stated, and final answers clearly indicated (with appropriate units and significant figures). You are expected to **show all your work**, including equations and sample calculations where necessary (especially when relying on spreadsheets or computer programs to generate results).

10. Human Studies Statement:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208).
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if

it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**

- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Program Director of the Natural Sciences Program, Dr. Edwin Cey by email ntscdirector@ucalgary.ca or phone 403 220-8393. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suypaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suypaca@ucalgary.ca.
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

Course Outcomes:

- Summarize the major forms of worldwide geothermal energy production and usage, and rank them relative to other forms of global energy production
- Explain the geology of the Earth and its various sources of energy, to describe how they control the distribution of geothermal energy resources around the globe

- Apply the scientific principles describing the flow and storage of heat and fluid to quantify energy and fluid flows for both high temperature and low temperature geothermal energy systems
- Identify, describe and differentiate the main types of geothermal electricity plant and ground source heating designs in relation to their energy output and conversion efficiency
- Debate the strengths and weaknesses of geothermal energy developments using well-reasoned arguments related to technical, environmental, social, and economic issues
- Communicate scientific understanding on geothermal energy topics of interest through formal reports or presentations and through informal conversations with peers and the general public

Department Approval:

Electronically Approved

Date: 2018-12-21 11:58