MIN E 310 Ore Reserve Estimation

Spring 2024 - May 06 to June 12

Course Description:

*3 (fi) (either term or Spring/Summer, 3-2-0) Conventional and geostatistical methods for construction of orebody models. Contouring techniques for mapping bounding surfaces of stratigraphic layers. Coordinate transforms and geometric techniques. Estimation and simulation methods for characterizing ore grade variability. Ore reserve classification, uncertainty assessment, mine selectivity, and grade control. Co-requisites: MATH 209, EAS 210, and MIN E 325

Course synchronous and asynchronous content delivery schedule:

Lecture Sections:

Section	Class Time	Location	Instructor	Office Hours
All Sections	Monday, Wednesday 12:00-13:20	NRE 2-090	Clayton Deutsch, PhD, P.Eng cdeutsch@ualberta.ca 7804929916	DICE 6-232 To be announced
LEC C1	Monday, Wednesday 12:00-13:20	NRE 2-090	Erten, Oktay, PhD erten@ualberta.ca	NREF 6-050 as requested

Students from all sections can go to any office hour.

TA Information:

Paulo Dias, NREF 5-052, paulomau@ualberta.ca
Zahra Ashtiani, NREF 5-052, zahmadia@ualberta.ca

Seminar Sections:

Section	Day	Time	Location
SEM E31	Wednesday	14:00 - 15:50	NRE 2-090

Course Objectives & General Content:

Learning Outcomes:

By the end of this course, students should be able to:

1. Assess the quality of data to be used in resource and reserve estimation
2. Infer statistical parameters required for prediction
3. Predict grades at unknown locations within a mineral deposit
4. Calculate the uncertainty in resources at a relevant production scale
5. Formulate a resource classification scheme for public disclosure

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Final Exam		As scheduled	40%
Assignments		As announced	40%
Midterm		In class	20%

The Faculty recommended grade point average for a 300 level course is 3.0. Instructors have the leeway to deviate from this average and can assign grades based on their own scheme. All grades are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades.

Term Work

All term work solutions will be posted no later than the last day of classes. All term work will be returned to students by the final day of classes, with the exception of major term work due in the last week of classes. The latter will be returned by the day of the final examination or the last day of the examination period if there is no final examination in the course as per university policy; instructors will make accommodations to return these term work. It is the responsibility of the student to pick up all their term work at the specified time and place. Any unreturned term work, shall be retained and then shredded six months after the deadline for reappraisal and grade appeals. Final examinations will be kept for one year as required by university guidelines and the Government of Alberta's Freedom of Information and Protection of Privacy Act.

Calculator Policy

Only approved non-programmable calculators are permitted in examinations. Any calculator taken into an examination must have a sticker identifying it as an acceptable non-programmable calculator (gold sticker). Students can purchase calculators at the University Bookstore with the stickers already affixed. Calculators purchased elsewhere can be brought to the Student Services where the appropriate sticker will be affixed to the calculator.

Text and References (Mandatory):

Mineral Resource Estimation, Rossi and Deutsch, 2014. You could get a copy or I will provide a PDF copy.

Website:

eClass

Did you know that the University of Alberta has various low-to-no-cost services to help students succeed? Visit http://www.deanofstudents.ualberta.ca/ for information about the academic, wellness, and various other support services available to U of A students. It's never too early or too late to seek help!

MIN E 310: Ore Reserve Estimation - Spring/Summer 2024

Week	Date	Prof	Lecture	Book	Topic	Assign Due
1	May 6	CVD	1	1	Class Overview	
1	May 8	CVD	2	2.1-2.2	Probability and Statistics	
2	May 13	OE	3	2.3	Declustering	1
2	May 15	OE	4	2.4,2.5	Gaussian and Inference	
3	May 20	N/A			Holiday	
3	May 22	CVD	5	3.1,3.2	Geological Controls and Implicit	
4	May 27	CVD	6	3.3-4.3	Block Model Setup	2
4	May 29	CVD	7	5.1	Data Collection	
5	June 3	OE	8	5.2,5.3	Sampling Theory	3
5	June 5	OE	9	5.4	QA/QC of Data	
6	June 10	OE	10	5.5	Data Variables	4
6	June 12	N/A			Midterm Exam	
7	June 17	CVD	11	5.6,5.7	Compositing and Density	
7	June 19	CVD	12	6.1	Variogram Calculation	
8	June 24	OE	13	6.2	Variogram Interpretation/Demo	5
8	June 26	OE	14	6.3	Variogram Modeling	
9	July 1	N/A			Holiday	
9	July 3	CVD	15	8.1	Fundamentals of Estimation	6
10	July 8	CVD	16	8.2	Fundamentals of Simple Kriging	
10	July 10	CVD	17	8.2	Ordinary Kriging and Setup	7
11	July 15	CVD	18	8.4,8.5	Practice of Kriging	8
11	July 17	CVD	19	11	Model Checking, Resource Calc	
12	July 22	OE	20	9,10	Probabilistic and Simulation	9
12	July 24	OE	21	13	Classification	
13	July 29	CVD	22	14	Grade Control	
14	July 31	CVD	23	All	Class Summary and Discussion	10

University and faculty policies

Respect and professionalism

The Faculty of Engineering is committed to fostering and protecting an equitable, inclusive, and respectful work and study environment in line with University of Alberta policies and professional engineering industry standards.

The faculty prepares students to uphold industry standards to become a Professional Engineer (P.Eng). Therefore, respect, professionalism, and accountability must be upheld within the Faculty of Engineering and the University of Alberta.

Academic integrity

All students are expected to follow the University of Alberta's Student Code of Behaviour and Student Conduct Policy. The faculty expects an environment free of harassment, discrimination, and bullying. We encourage you to talk to the Office of Safe Disclosure and Human Rights about experiences, questions, or concerns. Additional resources and support for students are attached below.

Engineering students studying in the province of Alberta should also follow the Code of Ethics set by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

Course outline policies, course requirements, evaluation and grading can be found in the University Calendar.

Safety during learning activities

In all Faculty of Engineering courses, labs, seminars or other learning activities, safety is of paramount importance. In some cases, laboratory work in a program requires high standards for risk management to keep potential hazards safely under control.

Anyone found to be unable to function safely in the class, lab, seminar or other learning activity may be asked to leave or be removed for their and the safety of other participants and instructors in alignment with the Student Code of Behaviour and Student Conduct Policy. As members, or prospective members, of the engineering profession, it is your responsibility to identify and inform the proper authorities of unsafe work.

Audio and video recording

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan.

Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Only those items specifically authorized by the instructor may be brought into the exam facility. Students should refrain from bringing any unauthorized electronic device into an examination room, including cell phones or other devices.

Student services and support

Health & Wellness Support

Counselling and Clinical Services

Free, short-term, appointment-based counselling and psychiatric services. Also offers drop-in workshops. Book an initial consultation. Visit uab.ca/CCS to learn more.

Wellness Supports Social Workers

Free one-on-one support for students in the areas of housing, finances, academics, personal wellness, life skill development, family dynamics, system navigation, and any area of life where there is a desire to invite change. Visit uab.ca/wellness to learn more.

Sexual Assault Centre

Free, anonymous, and confidential drop-in counselling. Visit uab.ca/UASAC to learn more.

The Office of Safe Disclosure & Human Rights (OSDHR)

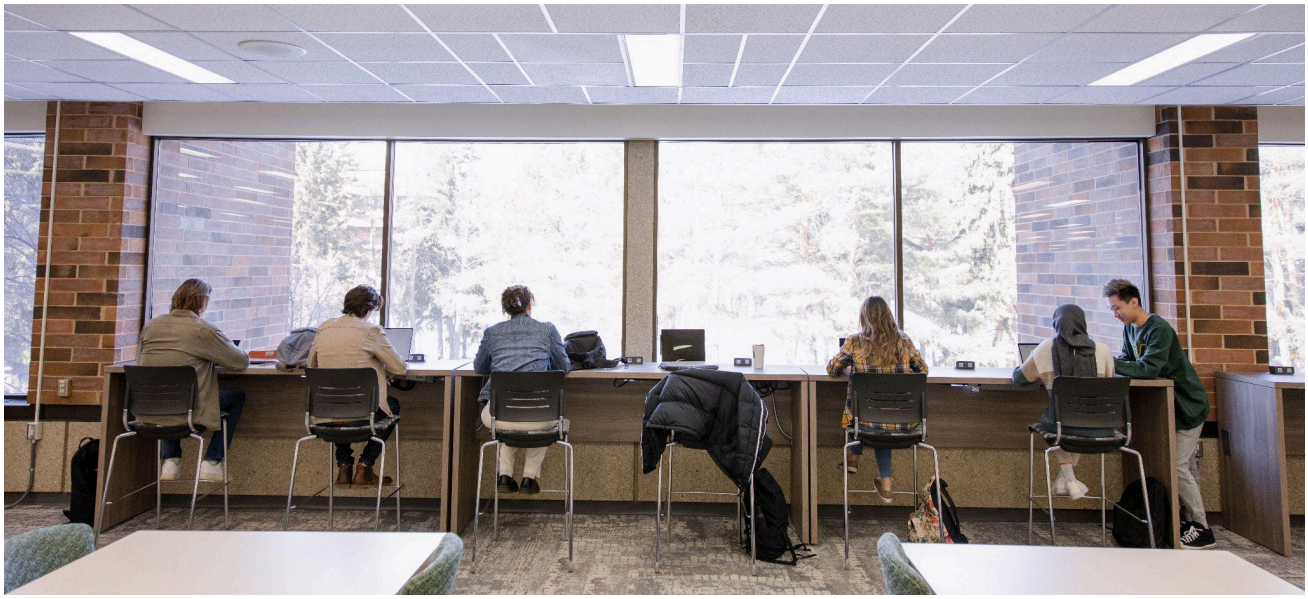
The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

HIAR (Helping Individuals at Risk)

If you're worried about someone, contact HIAR, who can help assess risk and connect individuals to support. Learn more at uab.ca/HIAR.

Immediate External Supports

Health Link Alberta: 811
Suicide Crisis Helpline: 988



Academic support

Academic Success Centre

Access to a variety of services to maximize your academic success. Learn more at uab.ca/ASC.

Accessibility Resources

Connects students with disabilities to accommodations. Learn more at uab.ca/Access under accommodations + accessibility.

Decima Robinson Support Centre

Academic support for 100- or 200-level introductory calculus, linear algebra and statistics courses. Visit uab.ca/DSC to learn more.

Engineering Student Success Centre

The Faculty of Engineering provides drop-in tutoring for first-year courses. Visit uab.ca/ESSC to learn more.

Office of the Student Ombuds

Call for complex problems and conflict mediation. Learn more at uab.ca/ombuds.

Financial support

Student Service Centre

For awards and other funding support. Learn more at uab.ca/ask.

Campus Food Bank

The Campus Food Bank Society is an independent charity supporting University of Alberta students, faculty, staff, and alumni for up to five years. For additional information visit their website at campusfoodbank.com.