SMITH ENGINEERING
Queen's University

Robert M.Buchan
Department of Mining

The Robert M. Buchan Department of Mining
Graduate Teaching Assistantships
Winter Term 2025

All graduate students are invited to apply for a Graduate Teaching Assistantship for the winter 2025 term. Please see the attached list of courses being taught this term that require TA support.

Following the Collective Agreement, students who are studying in The Robert M. Buchan Department of Mining will be given preference over students from outside the department.

It is recommended that you read the PSAC Local 901, Collective Agreement for Graduate Teaching Assistants found at:
https://www.queensu.ca/facultyrelations/psac%20901-1/collective-agreements/MoAs/LoUs

The posted positions are conditional upon enrollment figures and budgetary approval. Positions will remain posted until they have been filled (no less than 7 business days) from the date of posting and remuneration will be in accordance with the Collective Agreement.

TA assignments could include duties such as leading laboratories, tutoring, hosting virtual office hours, marking of assignments, reports, quizzes, and exams. Due to changes in enrollments, some positions may have their hours adjusted once the semester begins. Any necessary training will be included in the assignment.

It is your responsibility to ensure you make yourself available to complete the TA work. If you are planning on being away from internet access for a significant amount of time during the semester, please indicate this when submitting your application and keep your employment supervisor up to date.

Note that for winter 2025, final exams are scheduled until April 23rd so it is possible that marking may be required right to the end of the month.

As TA-ships do not form part of the funding package for graduate students in The Robert M. Buchan Department of Mining, TA-ships will only be offered as per the criteria outlined in Second Preference – Group B or to candidates in Group C or D. In addition, we will do our best to match your preference to course offerings.

Second Preference – Group B: for qualified graduate students registered as:
(i) students in a department or program in which the TA-ship will be offered; or
(ii) students in an interdisciplinary program with TA budget resources, and for whom
(iii) the TA-ship will not form part of the funding commitment offered by Queen's University; or
(iv) there is currently no funding commitment provided by Queen's University.

Third Preference – Group C: for qualified graduate students that have previously held a TA-ship or TF-ship for the Employer.

Fourth Preference – Group D: for qualified graduate students that have not yet met the criteria as set out in A, B, or C.

Application Process

- Review the list of available TA positions for the Winter 2025 Term.

  MINE Undergraduate - https://www.queensu.ca/academic-calendar/engineering-applied-sciences/courses-instruction/mine/

  MNTC - https://www.queensu.ca/academic-calendar/engineering-applied-sciences/courses-instruction/mntc/

  MINE Graduate – https://www.queensu.ca/academic-calendar/graduate-studies/courses-instruction/mine/

- Make note of your top 3 preferences.

- Complete the application form. Please note that you are required to upload your CV, cover letter, and transcript **in PDF** in the application form.

Applications will be reviewed at the end of the application period.

Applications are due by 12noon, Thursday, November 28, 2024

Undergraduate Courses

Course Code	Title	Term	Instructor	Estimated Enrollment	# of TA ships and hours	Required Background/Skills	Description
MINE 267	Applied Chemistry for Mining	W	Chris Pickles	63	4 at 60hrs each	Preference will be given to applicants with an undergraduate degree in Mining Engineering and with a background in mineral processing/chemical engineering.	This course provides an overview of the chemistry of inorganic and organic compounds used in the practice of mining and mineral processing including hydro-and pyro-extractive methods. Chemistry and chemical interactions for selected reagent formulations used in blasting, flotation/flocculation, leaching/precipitation, solvent extraction/electrowinning and pollution control technologies are outlined with relevant stoichiometry. Mineral stability and its relevance to metal extraction is discussed. Unary, binary and ternary phase diagrams are explored. The properties of solutions of interest are reviewed.
MINE 268	Applied Chemistry for Mining - Lab	W	Chris Pickles	53	4 at 60hrs each	Preference will be given to applicants with an undergraduate degree in Mining Engineering and with a background in mineral processing/chemical engineering.	This course exposes the students to the analytical techniques utilized in the mining and the mineral processing industries. The first part of each laboratory includes the principles of the analytical technique while the second part is concerned with the practical use of the technique. The analytical techniques are typical of those of analytical groups in most mining companies. The techniques studied include: sampling, digestion, Atomic Absorption Spectroscopy, Induction Coupled Plasma Spectroscopy, X-Ray Diffraction and fire assay. Safety in handling of hazardous chemicals is emphasized with a review of selected Material Safety Data Sheets and industry standards.
MINE 272	Applied Data Science	W	Asli Sari	52	3 at 60hrs each	Strong programming skills. Experience in Python, knowledge of numpy and matplotlib libraries. Good knowledge in statistics. Should have previously worked on a data analytics or machine learning project in Python	This course presents a comprehensive overview of the key elements of data science for engineers. Topics include data cleaning, organization and manipulation, data collection, visualization and noise filtering. Data analysis techniques including regression, decision trees, feature selection, clustering and classification are covered. Emphasis is on spatial analysis and visualization, as well as the analysis of time series. An introduction to advanced topics such as deep learning, big data management and analysis is provided. The focus is on the practical application of data science in the engineering context to make predictions and decisions based on the statistical inference of data.
MINE 326	Operations Research	W	Qian Zhang	44	2 at 45hrs each	Previous experience and/or background in optimization and simulation.	The course deals with the application of operations research methods in engineering with emphasis on mining applications. Topics covered are linear programming, optimization methods, transportation and network models, discrete optimization, non linear optimization, decision tree methods, simulation and elements of geostatistics as applied to mining. Lab sessions also deal with forecasting techniques, regression analysis, dispatch problems, planning and scheduling.
MINE 339	Ventilation and Hydraulics	W	Mahmoud Alzoubi	33	1 at 60hrs	Previous experience and/or background in mine ventitlation and fluid mechanics.	Hydraulics of air flow through mine openings and ducts is first studied, leading to mine ventilation Hydraulics of air flow through mine openings and ducts is studied, leading to mine ventilation design calculations and ventilation network analysis. Topics related to the design of mine ventilation systems include: statutory regulations and engineering design criteria, ventilation circuit design, natural ventilation, testing, application and selection of mine ventilation fans, auxiliary ventilation design, psychrometry, mine air heating and cooling, dust and fume control, and ventilation economics. Health hazards of mine gases, dust and radiation are reviewed, together with statutory requirements for air quality. Procedures for conducting air quantity and quality surveys are also taught.
MINE 341	Open Pit Mining	W	TBA	43	2 at 60hrs	Background in open pit mining. Ability to grade and provide feedback to students on written ability to provide lab support in Whittle mine optimization software. Available to assist with midterm and final exam marking and grade entry.	This course presents technologies and techniques employed in open pit mining with a focus on strategic and operations planning considerations. Topics of study include: pit design, application of algorithms for economic pit limit analysis, equipment selection, production scheduling, material control and reconciliation, remote sensing and geomatics applications, mine waste management, emerging trends in open pit mining, and mine safety. Regulatory controls and best practices in design are stressed for all stages of the mine life cycle. Environmental impacts of design decisions and mitigating strategies are explored. The use of software at various stages of the design and planning process is introduced and a strategic design project completed using commercial software applications.
MINE 344	Underground Mining	W	Abbas Taheri	42	2 at 60hrs	Previous experience and/or background in mining methods. Familiarity with RocScience software including UNWEDGE and RS2.	A study of underground mining technology with special reference to economic optimization in both design and production. Conventional and up to date mining methods are reviewed. Developments and trends in mining methods are closely analyzed. Mine design is studied in relation to ore reserves, tonnage and grade distribution, equipment with emphasis on the growing importance of maintenance on underground machinery and capacities of various production units. Development and production costs associated with mining are an inherent aspect of this course. The problems and possibilities of existing and evolving mining techniques are reviewed.
MINE 445	Open Pit Design (Capstone)	W	TBA	14	1 at 30hrs	Must have background with Surpac or Vulcan, Whittle and Project Management. Must be able to provide lab support in Surpac or Vulcan, and Whittle.	The material of MINE 341 is applied to the design of an open pit mine. Special attention is given to the selection of equipment and the use of computers in strategic and detailed mine planning and scheduling. The course uses commercial mine planning software to enable small groups of students (2-4) to complete mine designs starting with topography maps, drill information, and mineral inventory block models. Several real deposit databases are used including gold, copper, copper/molybdenum, copper/zinc. The deposits are evaluated, feasibility assessed, and production decisions discussed.

Course Code	Title	Term	Instructor	Estimated Enrollment	# of TA ships and hours	Required Background/Skills	Description
MINE 448	Underground Design	W	TBA	10	1 at 30hrs	Previous experience and/or background in course topics and experience with mine design software.	This course provides an opportunity to apply a knowledge of basics to the design of an underground mine. Initial design information may range from diamond-drill assay data to a partially or completely designed mine. The problem of design or renovation entails ground stability, ventilation, systems analysis, equipment selection, maintenance, etc, with safety and economics as the basic criteria for design.
MINE 458	Process Investigations	W	TBA	6	1 at 30hrs	Expeience in Mineral processes in lab environment.	Projects may involve design of new processes, re-design of existing processes, process simulation and process innovation. Oral presentations and a formal report are required at the end of the term.

Graduate Courses

Course Code	Title	Term	Instructor	Estimated Enrollment	# of TA ships and hours	Required Background/Skills	Description
MINE 803	Community Engagement and Mining	W	Anne Johnson	30	1 at 45hrs	Knowledge of the subject.	This course extends the exploration of a range of community development and community engagement domains, techniques and skills, relating to social technique, participatory approach to community development planning and programming; the use of partnerships as a vehicle for participatory development; social impact assessment; community engagement planning; program monitoring and evaluation. It expands and reinforces the participant's understanding of how the application of professional approaches and methods can assist communities and companies to build sustainable, organized relationships and structures within the broader context of mining and development practice, locally, nationally, and globally.
MINE 804	Mining Projects and Indigenous Peoples	W	Anne Johnson	30	1 at 45hrs	Knowledge of the subject.	This course examines the social, political and economic relationships that exist between Indigenous Peoples and external parties in the development of commercial mining operations. The course will review specific social, political and economic issues arising from the engagement of Indigenous Peoples with the minerals industry, and the skill sets and knowledge base that are critical to negotiating positive relationships between Indigenous Peoples and mining companies.
MINE 821	Hydrometallurgy and Electrometallurgy: Theory and Practice	W	TBA	15	1 at 30hrs	Knowledge of the subject.	This lecture- and seminar-based course covers the advanced topics about hydrometallurgy and electrometallurgy. The course involves the theory of leaching, solid liquid separation, solvent extraction and ion exchange, chemical precipitation and electrometallurgy. In addition, several process options and flowsheets for the recovery of selected base metals (copper, zinc and nickel)and gold will be presented. Each student will perform a literature survey, write a report and present on a topic of interest.
MINE 835	Applied Machine Learning	W	Asli Sari	15	1 at 30hrs	Knowledge of the subject.	This course introduces the theory and practice of machine learning for graduate engineering students. The course presents tools for analysis and prediction using machine learning techniques, including regression, support vector machines, hidden Markov models, ensemble methods, supervised and unsupervised learning. The course will be focused on the fundamentals of these techniques, the advantage, disadvantage and usage context of each technique, and their application in the engineering field. Engineering examples for each topic will be provided.

MNTC Courses

Course Code	Title	Term	Instructor	Estimated Enrollment	# of TA ships and hours	Required Background/Skills	Description
MNTC 306	Mineral Processing - Unit Operations	W	TBA	18	1 at 60hrs	Knowledge of the subject.	This course focuses on unit operations of mineral processing. Mineral separation processes of a physical and physicochemical nature are studied. Topics include size reduction, classification, flotation, flocculation, gravity concentration, magnetic, electrostatic separations and dewatering. Surface phenomena involving fine particle processing, reagent classifications, flotation machines and circuits, plant practice in ore flotation are discussed. The course content is presented in a series of purpose-built videos and optional material. There is an emphasis on project-based team work in this course. Your instructor will form the Teams at the beginning of Week 2 and the Teams will be kept the same for all three projects during the semester.
MNTC 418	Sustainability and the Environment	W	TBA	33	2 at 45hrs	Knowledge of the subject.	This course describes the evolution of policies, operational procedures, and management systems related to sustainability and the social, economic, environmental, ethical, and technical design challenges facing the mining industry. Students will be introduced to a range of complex situations with significant sustainability implications that need to be addressed responsibly during the life cycle of a mine, such as resource, water, and waste management, mining -community relationships, mine closure and rehabilitation, as well as a mine closure's community and environmental implications.