McMaster University | Materials Science & Engineering

Graduate Student Handbook

Department of Materials Science and Engineering

2020 - 2021

McMaster University, Hamilton, Ontario

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Welcome to Materials Science and Engineering

The Graduate Student Handbook, 2020-2021 outlines the policies and procedure followed by the Department of Materials Science and Engineering. All graduate students are responsible to familiarize themselves with the policies, regulations and procedures within the School of Graduate Studies Calendar, 2020-2021, specifically the "General Regulation of the School of Graduate Studies section. The calendar is available online at: https://academiccalendars.romcmaster.ca/index.php?catoid=42

COVID-19

At the time of publication, due to COVID-19 restrictions, the department office and other administrative offices referenced in this handbook remain closed. Most offices, administrative staff, and faculty including those in the department have shifted services online. We are connecting with our students by email and MS Teams, and ask that you please review this handbook and websites included herein for information **BEFORE** sending an email to the department's Graduate Administrative Assistant. To provide certainty for the McMaster community, the university has announced that classes for the 2020 Fall Term will be online. Certain sections of this handbook may vary as a result. The university reserves the right to change its policies in the face of government (federal, provincial and municipal) and public health announcements.

Contacts

DEPARTMENT LEADERSHIP

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MCMASTER ENGINEERING GRADUATE SOCIETY (EGS)

MSE Department Student Representative
Elliot Asare (PhD candidate) |JHE-A203C|asaree@mcmaster.ca

Disclaimer

In the event of a discrepancy between the information provided in the department's Graduate Student Handbook, 2020-2021 and the School of Graduate Studies Calendar, 2020-2021, the latter prevails.

General Information

Arrival

Upon your arrival, please come to the department's administrative office, located in John Hodgins Building (JHE) 357. Bring a copy of your offer letter and all official documents, as indicated in your offer letter, to clear your conditions.

- Official transcripts
- Official translations In English (if required)
- Confirmation of degree completion (if not indicated on your transcript)
- **International students only**: bring a copy of your study permit. We will keep a copy on file.

Condition Clearing

Conditions must be cleared by the date indicated on your offer letter. This does not restrict your current enrollment. Mosaic (the university's on-line PeopleSoft-based administrative information system) lists your conditions, which will be updated as they are cleared by the School of Graduate Studies. Failure to clear the conditions will result in your offer be rescinded.

Welcome Package

Every new graduate student receives a welcome package, which includes important paperwork that must be completed and submitted to the department's Graduate Administrative Assistant. To prevent delays in pay, please complete the following forms as soon as possible:

- Direct deposit forms (Mosaic and scanned paper copy)
- Tax forms: social insurance number (SIN) required
- Employee information form

Desk Assignment and Graduate Student Office Policy

Desks are assigned to all full time, in-time graduate students. While we do our best to provide overtime students a desk, this is not always possible, and we may ask you to vacate or relocate.

Graduate student offices are also shared offices. The department tries to keep similar research/supervisor groups together. At times discussions can be louder than anticipated. Please be mindful of others working nearby, and if possible, take lengthy and group conversation outside. The "orange room" (JHE 352), "green room" (JHE 247) and engineering graduate student lounge (JHE 328) are options for meeting spaces and are available on a walk-in basis or can be booked in advanced. Contact the department's Graduate Administrative Assistant to book a room. Additional meeting spaces are available and can be booked through The Hub via email at thehub@mcmaster.ca . When booking a room, provide your name, student number and dates.

Each graduate student office is equipped with a microwave and fridge for short term, small snacks and beverage storage. Meal preparation should be done at home. Alternatively, the engineering graduate lounge (JHE 328) has a microwave, fridge and sink for use as well. Small snacks and cutlery may be left in the office if concealed in an air-tight plastic container. Dispose of food wrappers/scraps frequently in the bins in the hallway. If food issues, pests, rodents or other problems related to food become a concern, food and drinks privileges may be revoked. Food or drinks are not permitted in labs. The custodial staff regularly washes the floors and empties the trash containers. Large items for disposal that do not fit in the containers need to be clearly marked for disposal. The custodians do not clean desks or equipment of any kind.

****Graduate students are responsible for the general tidiness of their office, appliances, and their personal areas****

Keys

Multiple keys are commonly used by graduate students. Your supervisors will inform you about what keys are required. Once the card access key form has been completed and signed by the appropriate supervisor and administrative staff, take the form to The Hub (JHE 216A). There is a $20 key deposit required for each physical key and you need to show your student ID. The deposit is refunded when the key is returned when you graduate. For safety and security reasons do not lend your keys or allow anyone else into your office after hours. External building keys are not permitted.

Scent Awareness

Persons entering our facilities are encouraged to use unscented products. The purchase and use of unscented products should be preferred over scented substitutes. **Please minimize the use of, and exposure to, scented products in your office and when visiting the department office (JHE 357).** Scented products more commonly used include:

- Personal hygiene products (e.g., shampoo, conditioner, hairsprays, deodorants, colognes, after-shaves, fragrances, perfumes, lotions, soaps, cosmetics and creams);
- Industrial and household chemicals and cleaners;
- Air fresheners (e.g., deodorizers, potpourri, oils and candles); and
- Various household products

Graduate Mailboxes

Physical mailboxes are located in JHE 355. Incoming mail is filed under the first letter of your last name. It is your responsibility to check your mailbox frequently. The correct address for your personal mailbox is:

Name, Graduate Student
Materials Science and Engineering (JHE 357)
McMaster University
1280 Main Street West
Hamilton, ON L8S 4L7

Outgoing mail can be left in the outgoing mail tray in the Department office (JHE 357).

Fed-Ex

Students can FedEx items for research purposes. A completed FedEx form is required. You need an account number from your supervisor that is charged for the expense. The form is available in the resource folder on the department website:
https://www.eng.mcmaster.ca/materials/resources#forms

Photocopying and Paper

Each graduate student office is equipped with a printer. Paper is stored in the department office (JHE 357), underneath the set of faculty mailboxes. When taking paper, please fill in the form stating your name, supervisor and how many packages you are taking. Your supervisor is billed at the end of the month. There is no need to ask for permission. There is also a photocopier/scanner in JHE 355 for larger jobs. Photocopying or scanning for research-related purposes also requires an account number from your supervisor that is charged for the expense.

Bulletin Boards and Email Messaging

Check you McMaster email regularly for important information such as events, scholarships, courses, and job announcements for graduate students. You can also refer to the bulletin board located outside the department office for similar postings and on the bulletin boards in each graduate student office. It is important that you check your email and/or the notice board regularly to see if anything might apply to you.

MSE Graduate Student Representatives

Each year, a set of graduate students (domestic and international) are elected to serve as liaisons between the graduate student body and the department faculty and staff. These representatives participate in the monthly department meetings and are responsible to provide a voice for graduate student body and collect and disseminate relevant information back to graduate student body.

Peer Mentor Program

The department is excited to offer all incoming students an opportunity to be matched with a senior graduate student. The objective is for the mentor to provide informal local information and advice on getting started to the mentee. This may include communication pre-arrival, guidance upon arrival and throughout the first few months as new students settle into the McMaster and Hamilton community. Please contact the Grad Admin for more information.

Social Insurance Number (SIN)

It is essential that the School of Graduate Studies and Human Resources have your Canadian Social Insurance Number (SIN) on your record (for income tax receipt purposes). You will be asked to provide your Canadian SIN on the direct deposit forms and tax forms. Your Canadian SIN is a nine-digit number that you need in order to work in Canada or to have access to government programs and benefits. You can obtain a SIN upon arrival at the airport.

If you do not have a Canadian SIN number, please apply for one immediately either at:

Human Resources and Skills Development Canada (HRSDC)
Hamilton Mountain Human Resource Centre of Canada
1550 Upper James Street, Hamilton, ON (corner of Rymal Road)
905-572-2211

or:

Hamilton East Satellite Office
2255 Barton Street East, Hamilton, ON (corner of Nash Road)
905-572-2211

International students need a Canadian SIN to work in Canada. If you hold a Teaching Assistantship (TA), then you will need to take the following documents with you when you apply:

- Your employment contract/offer letter
- Your passport and study permit
- Completed SIN application form

****Your new Canadian SIN card will have the same expiry date as your study permit.
Remember to renew both documents at the same time****

Student Authorizations (International Students Only)

International students admitted to graduate studies degree programs must have a valid study permit issued by Immigration, Refugees and Citizenship Canada (IRCC), provided that their program of study is longer than six months. A copy of the study permit must be submitted to the School of Graduate Studies upon arrival at the university. International graduate students without valid study permits will not be allowed to enroll.

Student permit extensions take some time to process, so plan ahead. Remember that Canadian SIN and study permits have expiry dates. The ultimate responsibility for maintaining up-to-date documentation lies with you – the graduate student. Remember also that it is your responsibility to ensure that your passport remains current. More information is available on the Immigration, Refugees and Citizenship Canada website:
https://www.canada.ca/en/immigration-refugees-citizenship/services/study-canada/study-permit.html

Verification Letter Request

International students may need the university to issue different types of letters for different purposes. International Student Services has put together a list of possible letters you might need on their website: https://iss.mcmaster.ca/immigration/lettersandstatus/#renewstudy

If you require a letter to verify your status and financial details for work authorization, visas, travel and so forth please print and complete the request form found in the resources folder on the department's website: https://www.eng.mcmaster.ca/materials/resources#graduate-students

NOTE: the department staff cannot provide information about Visa or immigration. Students should contact the Immigration and Mobility Advisor via the university's international student services (ISS) website: https://studentsuccess.mcmaster.ca/international-students/immigration-advising/

Health Insurance Information

All registered students are required to have approved hospital and medical insurance. Medical costs in Canada are very expensive; therefore, having health insurance covered is essential. Ontario residents and permanent residents must have Ontario Health Insurance Plan (OHIP) coverage. International, visiting and exchange students must have individual coverage under the University Health Insurance Plan (UHIP) and coverage for any dependents. The Graduate Student Association (GSA) also provides Studentcare Health Plan. Please refer to the "Graduate Students Association" section further in this handbook.

Permanent Residents (OHIP)

Permanent residents who require health coverage under OHIP must apply in person at a ServiceOntario centre. Please visit www.ontario.ca for information and to find the closest ServiceOntario centre.

International Students (UHIP)

UHIP is a mandatory, comprehensive health insurance plan that provides health coverage for international and incoming exchange students. UHIP covers medically necessary doctors and hospital visits within Ontario for international students, incoming exchange students and dependents (spouse and children).

Coverage

Through UHIP, your necessary medical costs are covered for the entire academic year, from September 1 to August 31 with a few exceptions for incoming exchange students and other students with plans to study at McMaster for fewer than 12 months.

Your UHIP coverage begins on the tenth day of the month before your academic term start date or your scheduled arrival date in Canada, whichever is later. If you plan to arrive in Canada before your UHIP coverage begins, the department recommends that you purchase additional medical insurance. This way, you'll be covered if you need to access health care before your UHIP coverage starts.

Enrollment

If you're an international student, you're automatically enrolled in UHIP every year. However, it's your responsibility to ensure that your coverage is correct. Check your account on your Mosaic Student Center > Finances > Other Financial > View/Maintain UHIP.

UHIP CARD

In late August or early September, your UHIP provider, Sun Life Financial, will send an email to your McMaster email account with your UHIP card attached. To make sure you receive your UHIP card, please make sure you've activated your McMaster email account.

When you receive your UHIP card, print a copy and carry it with you at all times. This way, you'll have it easily accessible in case you need to seek medical care.

If you have dependents living in Ontario with you please contact the university's international student services (ISS) at iss@mcmaster.ca or ext. 24748 for further information on how to register your dependents for UHIP. **Dependents must enroll in UHIP within 30 days of arrival in Canada.** More information is available on the university's international student services (ISS) website:
https://studentsuccess.mcmaster.ca/international-students/health-insurance/

Dental Plan

All full-time graduate students who are receiving a Teaching Assistantship (TA), or a Research Assistantship (RA) in lieu of a TA of 130 hours or greater, will have dental plan premiums deducted each month for the full academic year (September 1 to August 31). Provisions for opting-out of the dental plan, or for obtaining family coverage, are covered in a separate document that describes the Canadian Union of Public Employees (CUPE) Local 3906 dental plan. Dental claim forms and opt out forms are available in PDF-format on the CUPE Local 3906 website:
http://www.cupe3906.org/wordpress/benefits-forms/unit-1- benefits/dental

The Graduate Student Association (GSA) also provides Studentcare Dental Plan. Please refer to the "Graduate Students Association" section further in this handbook for more information.

CUPE 3906 Collective Agreement

Your TA position is a unionized one included in CUPE Local 3906 bargaining unit 1, and subject to the terms of the Unit 1 Collective Agreement (the "CA"). Under this agreement, the Employer will:

(i) Make copies of the revised collective agreement available within one month of the printing of this agreement in all Human Resources Services offices and academic units; and

(ii) Provide direct access, via an email link, one month after the start of each semester, to a copy of this collective agreement to each newly hired employee, at no cost to the employee upon commencement of his/her initial assignment, unless a printed copy is requested by the employee.

The Collective Agreement is available on your local CUPE website:
https://cupe3906.org/tas-unit-1/collective-agreement/

Payroll Information

Research Scholarships

Your research scholarship paid by your supervisor from a research grant is paid in lump sum installments via direct deposit at the beginning of each term, unless otherwise specified by your supervisor. All other scholarships are also disbursed to the student in lump sum installments via direct deposit at the beginning of each term. Further information about student accounts, timing of payments and payment schedule for the 2020-2021 academic year is available on the School of Graduate Studies website:
https://gs.mcmaster.ca/scholarship-payment-schedules/

Please recognize that the research scholarship support is provided for six terms (24 months) for the MASc program and twelve terms (48 months) for the PhD program. Only under very special circumstances are exceptions made to this policy.

Teaching Assistantships (TAs)

If you are to receive a TA, as indicated in your offer letter, you will be paid bi-weekly by direct deposit, based on when you are scheduled to work. TA payments are typically held in the Fall Term (Term 1) from September to December 2020 and/or the Winter Term (Term 2) from January to April 2021. All first time TAs will be required to attend a mandatory training session. More information is available on the Human Recourses website:
https://hr.mcmaster.ca/employees/payroll/teaching-assistants-payroll-information/

Scholarships and Awards

The Faculty of Engineering has a policy ensuring that the gross pay minus tuition of any newly-hired full-time, non-overtime PhD students is a minimum of $16,000. There is no such policy for newly hired, non-overtime MASc students.

There are three types of additional funding available to graduate students:

1. External major scholarship and awards that have an associated application process
2. Internal (department) scholarships and awards that have an associated nomination process
3. University travel awards (limited number) that have an associated application process

The timing of most scholarships and awards take place in the Fall Term (Term 1) and the successful applicants are notified in the Winter term (Term 2). The department strongly encourages graduate students to apply for all external and internal scholarships and awards. Further information and descriptions are available on the School of Graduate Studies website:
https://gs.mcmaster.ca/awards-funding/awards-funding.

Additional awards are available from McMaster's Engineering Graduate Society (EGS) and Graduate Student Association (GSA). Further information and descriptions are available on the respective websites:
http://egs.mcmaster.ca/travelawards/
https://gsamcmaster.org/gsa-awards/

A list and description of external and internal scholarships and awards available for graduate students in the department is provided in Table 1 below.

Table 1: External/Internal Scholarships and Awards

EXTERNAL SCHOLARSHIPS AND AWARDS		
Award Name	**Description**	**Value**
Ontario Graduate Scholarship (OGS) The Queen Elizabeth II Graduate Scholarship in Science and Technology (QEII-GSST)	The Ontario Graduate Scholarship (OGS) and The Queen Elizabeth II Graduate Scholarship in Science and Technology (QEII-GSST) programs provide funding to full-time students at the Master's and Doctoral levels. They are merit-based scholarships for students with an A- or above average.	Varies
Ontario Graduate Fellowship (OGF)	Ontario Graduate Fellowships (OGF) provide funding to full-time students in graduate studies at the masters and doctoral level. It's a merit-based scholarship for students with an A- or above. Canadian Graduate Scholarship Master's or Doctoral (CGS) applicants through McMaster University are automatically considered for these awards.	$12,000

NSERC – CGS-M	The objective of the Canada Graduate Scholarships-Master's (CGS M) Program is to help develop research skills and assist in the training of highly qualified personnel by supporting students who demonstrate a high standard of achievement in undergraduate and early graduate studies. The CGS M Program provides financial support to high-calibre scholars who are engaged in eligible Master's or, in some cases, doctoral programs in Canada (refer to Eligibility). This support allows these scholars to fully concentrate on their studies in their chosen fields.	$17,500
NSERC – CGS – D	The CGS D program supports high-calibre students engaged in doctoral programs in all academic disciplines. This support allows scholars to fully concentrate on their doctoral studies, to seek out the best research mentors in their chosen fields and contribute to the Canadian research ecosystem during and beyond the tenure of their awards.	$35,000
NSERC – PGS-D	The NSERC Postgraduate Scholarships – Doctoral (PGS D) program provides financial support to high-caliber scholars who are engaged in an eligible doctoral program in the natural sciences or engineering. This support allows these scholars to fully concentrate on their studies and seek out the best research mentors in their chosen fields. Applications to the PGS D program will automatically be considered for the Alexander Graham Bell Canada Graduate Scholarship – Doctoral (CGS D) award, which is offered to the top-ranked applicants; the next tier of meritorious applicants will be offered a PGS D award.	$21,000
Vanier	The Vanier CGS program aims to attract and retain world-class doctoral students by supporting students who demonstrate both leadership skills and a high standard of scholarly achievement in graduate studies in the social sciences and humanities, natural sciences and/or engineering and health.	$50,000
INTERNAL SCHOLARSHIPS AND AWARDS		
The Dr. Colin Webber Graduate Scholarship	Established in 2013 to honour the memory of Dr. Colin Webber, McMaster University Professor, Physicist, Radiation Safety Expert, Teacher, Mentor, and Leader in the field of bone research. To be awarded by the School of Graduate Studies to master's or doctoral students. Preference will be given to students who demonstrate interest in bone research.	$1,600
The H.G. Hilton Master's Scholarship	The H.G. Hilton Master's Scholarships were established by the income from a bequest in the estate of Hugh G. Hilton, at one time Chief Executive Officer of Stelco and member of the McMaster Board of Governors support a Master's scholarship. The scholarship is tenable for one year, and is awarded annually to incoming Canadian citizens, permanent residents or, international students from departments which offer full-time Master's graduate studies. Priority will be given to students intending research in Canadian industry or industrial problems. Other things being equal, preference will be given to deserving children of employees or former employees of Stelco Ltd.	$3,000

The David Alan Reid Kay Memorial Prize	The David Alan Reid Kay Memorial Prize was established in memory of David Alan Reid Kay, Professor in the Department of Materials Science and Engineering from 1969 to 1997 to perpetuate the spirit of service to the university and materials community, as well as research excellence for which he was so well known. The prize will be awarded annually to a graduate student registered in Materials Science and Engineering based on the criteria above by the School of Graduate Studies on the recommendation of the Chair of the Department of Materials Science and Engineering.	$500
The Dante Cosma Graduate Memorial Scholarship	The Dante Cosma Graduate Memorial Scholarship was established in 1997 by family, friends and colleagues of Dr. Dante Cosma, in recognition of his years of service in the Faculty of Engineering at McMaster University, and to his support of engineering students in their pursuit of higher education. To be awarded to a graduate student in the Faculty of Engineering by the School of Graduate Studies on the recommendation of the Dean of Engineering. Preference will be given to a student studying metallurgy.	$1,000
The Dr. W. Smeltzer Scholarship	The Dr. Walter Smeltzer Memorial Scholarship was established in 2000 by Mrs. Grace Smeltzer in memory of her husband, Dr. Walter William Smeltzer, researcher and professor in Materials Science at McMaster University from 1959 to 1992. The scholarship is to be awarded to a student in the Department of Materials Science and Engineering (MSE) who is deemed to have submitted the most outstanding graduate thesis over the previous two-year period. PhD theses will be recognized in even-numbered years, and Master's theses recognized in odd-numbered years. The School of Graduate Studies will award the scholarship on the recommendation of the Department of Materials Science and Engineering.	$1,250
OTHER		
Engineering Graduate Society (EGS) Travel Awards	The EGS Travel Awards are graciously sponsored by the Faculty of Engineering at McMaster University. For the 2018-2019 academic year, $25,000 CAD has been allocated for McMaster Engineering Graduate Students. Awards are valued up to $1,200 CAD; this is dependent on the number and quality of the applications*.	Varies
Graduate Student Association (GSA)	The GSA awards a number of travel awards (up to $500) every semester for travel to conferences to present, or to undertake research relevant to their field of study. GSA Travel Awards are funded from the proceeds of the GSA Development Fund, which is sustained by contributions from Graduate Students and the University. Award recipients will be asked to voluntarily contribute a 250-word statement of how this award and travel contributed to their graduate experience, which may be posted on the Graduate Studies and GSA websites and other media sources.	Varies
Wilson Leadership Scholarship Award	The Wilson Leader Scholarship Award for graduate students is different. Valued at up to $25,000, it's a leadership development and career launcher program that builds on your studies. It	Varies

	involves about 15 hours/month over 6 months – less than a TA or RAship. And it includes experiential learning opportunities. The award program is open to incoming and current McMaster graduate students at all levels whose research and interests relate to democracy, the economy, education, healthcare, the impacts of technology, or public policy in a Canadian context.	

Policy on Major Graduate Scholarships/Awards

For the purposes of this policy, a "major graduate scholarship" includes the following: NSERC, Vanier, OGS, CREATE, QEII GSST, CSC (China), CNPQ-Brazil, KASP (Saudi Arabia), and EAA (Egypt). In no case can the total support per year provided to you as a major scholarship holder less than the Faculty of Engineering minimum stipend or the value listed in your admission letter. New graduate students who bring with them a major scholarship, the total support per year provided to the graduate student cannot be less than the Faculty of Engineering minimum stipend.

If you are currently enrolled in an engineering-hosted program and receiving a major external scholarship/award administered by the university, the total stipend currently being provided to you by the department cannot be reduced by more than $2,500 per term for each term in which you hold the major scholarship/award (i.e., maximum stipend adjustment of $7,500 per year). Table 2 below summaries the reductions associated with major scholarships/awards, as levied by the department.

Table 2: Department Reductions to Major External Scholarships/Awards

Award	Value	Duration	Net Minimum Increase to Student Funding Package
OFS	$12,000	1 Year	$4,500
OGS	$15,000	1 Year	$7,500
NSERC CGS-Master's	$17,500	1 Year	$10,000
NSERC CGS-Doctoral	$35,000	2 or 3 Years	$27,500
NSERC PGS-Doctoral	$21,000	2 or 3 Years	$13,500
Vanier	$50,000	3 years	$42,500

School of Graduate Studies (SGS)

The School of Graduate Studies website provides robust pages of information and resources including academic services, awards and funding, news and events. Familiarize yourself with the School of Graduate webpage and the resources folder on the department website. In addition to the Graduate Student Handbook, 2020-2021, you are responsible for familiarizing yourself with the School of Graduate Studies Calendar 2020-2021 and the School of Graduate Studies website. Here you will find information, policies, regulations and procedures as they pertain to you and your graduate studies.

School of Graduate Studies Calendar 2020-2021: https://academiccalendars.romcmaster.ca/index.php?catoid=42
School of Graduate Studies: https://gs.mcmaster.ca/

School of Graduate Studies Contact Information:

- General questions: askgrad@mcmaster.ca
- Student accounts (tuition and fees): student.accounts@mcmaster.ca
- Thesis preparation and PhD defences: gthesis@mcmaster.ca
- Scholarships and awards: graduatescholarships@mcmaster.ca

Leaves of Absence, Parenting Leave, Full-Time Off Campus, Vacation Time

Graduate students are required to be continuously registered to support the timely completion of their degree. On admission to a full-time program, the assumption is that a student will be full-time on-campus. Failure to be on campus on a full-time basis may result in automatic withdraw of the program.

Leaves of Absence (LOA)

Students may apply for a leave of absence in one of four categories:

1. Medical or disability leave
2. Parenting leave
3. Compassionate or personal leave
4. No course available leave

More information is available in the School of Graduate Studies Calendar 2020-2021:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734&hl=2.5.7+Leaves+of+Absence&returnto=search#2-5-7_leaves_of_absence

Parenting Leave

The parenting leave policy is intended to assist parents in successfully combining their graduate studies and family responsibilities. The duration of the leave will not be counted towards the time limits required to complete or make progress in their graduate studies program. More information is available in the School of Graduate Studies Calendar 2020-2021:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734&hl=2.5.7+Leaves+of+Absence&returnto=search#2-5-7_leaves_of_absence

Full Time Off Campus (FTOC)

Graduate students who will be off campus for more than two-weeks for purposes related to research must apply to be full-time off campus and complete the required form. More information is available in the School of Graduate Studies Calendar 2020-2021:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734&hl=%22parenting+leave%22&returnto=search#2-5-6_full_time_on_campus

Vacation

Graduate students are expected to be on campus for all three terms of the university year. Normal vacation entitlement is two weeks, to be scheduled by mutual acceptance with the supervisor. An exception to this allotment requires approval from the supervisor. More information is available in the School of Graduate Studies Calendar 2020-2021:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734&hl=%22parenting+leave%22&returnto=search#2_5_9_vacations

Graduate Students Association (GSA)

The Graduate Student Association (GSA) advocates for the needs of the collective, acts as a resource, and provides support and services that improve the graduate student experience.

Studentcare Health Plan/Dental Plan

Initiated by your student association, the Studentcare Health Plan provides students with unique health benefits. The Plan was designed by students for students to provide many important services and cover expenses not covered by a basic health-care plan (i.e. OHIP), or the equivalent (e.g. UHIP for international students) such as prescription drugs,

health practitioners, medical equipment, travel health coverage, and more. A comprehensive dental plan was added to cover those graduate students who were not covered by the CUPE 3906 plan (except for Divinity students).

Please note all GSA members are automatically enrolled in the Studentcare dental plan and are assessed the fees as part of their supplementary fees paid in September. Students who have a TA, or an RA in lieu, will be covered by the CUPE 3906 dental plan are automatically opted out the Studentcare dental plan and will receive a reimbursement cheque.

Graduate students who are covered by an alternative health and/or dental plan can upload proof of coverage using the Studentcare's secure website:
http://www.studentcare.ca/

Please remember that you need to pay the Studentcare plan fees on your student account. As mentioned above, once you are opted out, you will be receive your reimbursement cheque directly from Studentcare. More information, including opt out dates, is available on the Graduate Student Association website:
https://gsa.mcmaster.ca/services/health-and-dental/

Hamilton Street Railway (HSR) Bus Pass – Presto

At the time of publishing, information about PRESTO cards for 2020-2021 were not yet released. Please visit the Graduate Student Association website for updates:
https://gsa.mcmaster.ca/services/hsr-bus-pass/

International Student Services (ISS)

International Student Services (ISS) is a division of the student success centre that provides additional services and programs for international undergraduate, graduate, visiting and exchange students.

Services Include:

- Cultural transition support
- New student orientation and cross-cultural information
- Referral services on issues related to Immigration, Refugees and Citizenship Canada (IRCC), employment, access to Service Canada resources, Canada Revenue Agency (CRA), administration of the University Health Insurance Plan (UHIP) and settlement support
- Mentorship program
- Advice for internationally-minded Canadian students on study/work/intern and volunteer abroad opportunities
- Workshops and information sessions on practical educational topics that are not taught in classrooms, such as how to enhance the university student experience, opportunities to get involved in the community (the key to a successful adjustment to Canada), cultural adaptation issues, and how to improve writing skills
- Outdoor activities for international and exchange students

Together, we are committed to developing a collaborative approach to learning with both international and domestic students. As partners in learning, our goal is to provide an environment in which all students can have a memorable experience at McMaster. More information is available on the website:
https://studentsuccess.mcmaster.ca/international-students/

Student Wellness Centre

The Student Wellness Centre is the place on campus to address your wellness needs. They provide a range of counselling options, medical services and wellness programs so that you can get the most out of your McMaster experience, academically and personally! If graduate students have questions about any of the support programs available, they are

free to email wellness@mcmaster.ca and the response time is normally within 24 hours. More information is available on the website:
https://wellness.mcmaster.ca/

Counselling
An experienced counselling staff is available that will sit down with you in a consultation appointment and explore with you what your needs are and some of the best and most effective ways to address those needs.

Medical
A medical team, comprising nurses, family medicine doctors and specialist doctors, is available to provide a wide range of health services to provide you with personal health care during your time at McMaster.

Wellness
A wellness education team is available to provide health and wellness prevention and awareness programs to connect you with information, resources and services in the McMaster and Hamilton community. There are both workshops and drop-ins available for graduate students. There is also a mental health nurse staffed at the Wellness Centre full-time.

Mental Health – Empower Me Program
Empower Me is a service offered by your GSA specifically for graduate students. A 24/7 accessible counselling service to empower you to thrive! No issues are too big or small. Request support for depression, anxiety, grief, relationship problems, adjusting to life in a new country, addictions, mild substance abuse, educational conflict, disordered eating, and more. Though **Empower Me,** counselors are completely qualified to support graduate students in crisis. What's great about **Empower Me** is that you don't need to be in crisis in order to take advantage of their services. You could speak to a life coach about subjects like personal performance, well-being and growth, career, relationships, and finances.

****It is not recommended that students email about a crisis.**
In a crisis you can call one of the following:**

Good2Talk - 1-866-925-5454 or dial 211 and ask to be connected to Good2Talk
This is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/365.

EmpowerMe – 1-844-741-6389, 24/7
This is a 24/7 accessible counselling services to empower you to thrive, crisis support, mental health and well-being services.

More information is available on Student Wellness Centre website:
https://wellness.mcmaster.ca/crisis-support/

Student Accessibility Services (SAS)

Student Accessibility Services (SAS) provides academic accommodation assistance and related supports to students with disabilities at McMaster. Student Accessibility Services is available to assist students transitioning from high school, other post-secondary institutions, undergraduate, graduate continuing education students.

Note to all students seeking academic accommodations: Please be advised that the process for activating academic accommodations is different for undergraduate, graduate, and continuing education students. As you begin your studies in any of these areas, you must contact Student Accessibility Services to implement or update your student status and to activate accommodations. Accommodations do not automatically follow you as you move from one category to another

(e.g. undergraduate to graduate). For any questions related to this statement, please contact SAS. More information is available of SAS's website:
http://sas.mcmaster.ca/

Mosaic Student Centre

Mosiac is McMaster's on-line PeopleSoft-based administrative information system. Table 3 below lists the academic, personal and financial information that is available within the Mosaic student centre. You need to activate your MAC ID account and enable your MAC ID services to access Mosaic and, thus these services.

Table 3: Mosaic Student Centre Information

Academics:		
• Class Search • Academic Planner • Enrollment • Class Schedule - List & Weekly views	• Course History • Enrollment/Financial Letters • Grades • Program/Plan/Sub-plan Selection	• Transcripts - instant access to unofficial transcripts and ability to order official transcripts • Academic Advising • Service Request
Finances:		
• Account Inquiry • Make a Payment	• Charges Due • Enrollment/Financial Letters	• View/Print T2202A/T4A • Travel Expense Reimbursement
Personal Information:		
• Change mailing address	• Add emergency contacts	• Direct Deposit
Scholarships/Financial Aid:		
• Unified application for many scholarships and bursaries	• Application to determine eligibility for work/study positions	

Enabling Your MAC ID Services

Applicants are preassigned a MAC ID upon applying to McMaster University. Your MAC ID is your McMaster username that is unique to you as a graduate student and is used to access various McMaster resources such as:

- UTS student labs
- Wireless access on campus
- McMaster email account
- Avenue to Learn (the university's web-based course management system)
- Online voting system
- Oscar
- Microsoft 365

Password

Choose a strong password: it has to be at least eight (8) characters long, and has to include at least one character from two of the four groups below:

- Uppercase letters: A, B, C, ...Z
- Lowercase letters: a,b,c, ..z
- Numerals: 0,1,2,3,4,5,6,7,8,9
- Symbols on the keyboard that aren't letters or numerals: ~ ! @ # $ % ^ & * ( )_ + - = { } | [ ] \ : " ; ' < > ? , . /
- Set your challenge questions (used if you forget your password, and need to reset it).

For a complete description of all of these services, and managing your MAC ID visit the MAC ID website:
http://www.mcmaster.ca/uts/macid

McMaster Engineering Graduate Society (EGS)

The Engineering Graduate Society (EGS) at McMaster University was founded in 2014 to represent engineering graduate students at the university. The Engineering Graduate Society liaises with the Faculty of Engineering, Graduate Student Association, Science Graduate Association, undergraduate McMaster Engineering Society, CUPE Local 3906, and School of Graduate Studies to ensure that engineering graduate students' interests are heard. More information is available on the Engineering Graduate Society website:
http://egs.mcmaster.ca/

The Engineering Graduate Society council is composed of 27 council seats: 3 council seats from each engineering department. Ten of the seats are executive positions. The Engineering Graduate Society council members are also elected to sit on a variety of external committees and councils at the faculty and university level. Some of these committees include:

- Graduate Curriculum and Policy Committee (GCPC): to votes on curriculum and policy changes for graduate programs
- Graduate Council (GC): to vote on policies, regulations and procedures related to graduate studies
- Faculty of Engineering: to discuss pertinent topics of state, potential collaboration opportunities, and overall cohesiveness
- GSA Council: to deal with all matters pertaining to graduate students, supplementary fees, social events, alumni relations and so forth.
- Senate: to determine academic policy and regulating the system of education, economics, staffing and so forth. This is a separately elected position: that is, you must run independently to be voted to this position.

HEALTH AND SAFETY TRAINING PROGRAM

McMaster's occupational health and safety training program is designed to provide mandatory and site-specific safety training for all employees, graduate students, volunteers and visitors working in the university. Details of the program are documented in McMaster's Risk Management (RMM) Number 300. This document is mandatory reading. You are encouraged to make an appointment with your supervisory to specifically discuss the roles, responsibilities, procedural guidelines, record keeping and mandatory safety training matrix. It is available as a PDF and can be downloaded from the Human Resources website:
https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/

The mandatory safety training matrix is reproduced in Table 4 below. Additional safety courses such as, machine guarding, gas cylinder and hydrogen fluoride (HF) are required if the hazard is present. Please discuss the need for additional safety training courses with your supervisor. Health and safety training can be completed online through Mosaic under "Regulatory Training". Once you have registered for training your health and safety course is available in Avenue to Learn within one business day. Once you have successfully completed your training in Avenue to Learn you can view your training record in Mosaic one business day after completion. For more information regarding the health and safety training program and McMaster's Risk Management system is available on the Human Recourse website:
https://hr.mcmaster.ca/employees/health_safety_well-being/#tab-content-our-safety

****You must complete all required health and safety training before you can work as a researcher or TA****

Table 4: Mandatory Researcher/TA training Matrix

McMaster University Training Matrix - Teaching/Research Assistants					
McMaster University	Training Frequency (may be more frequent as per OH&S guidelines)	Teaching Assistant or Research Assistant - Category 1: Strictly Marking and office work, classroom presence	Teaching Assistant or Research Assistant - Category 2: Marking, office work, classroom presence, other duties, lab work with chemicals	Teaching Assistant or Research Assistant - Category 3: Marking, office work, classroom presence, other duties, lab work including chemical use and machine/equipment operation	Teaching Assistant or Research Assistant - Category 4: Marking, office work, classroom presence, machine/equipment use with no chemicals
Asbestos Awareness	5 yr	X	X	X	X
Chemical Handling & Spills	3 yr		X	X	
COVID-19 Awareness	Once	X	X	X	X
Ergonomics	5 yr	X	X	X	X
Fire Safety	3 yr	X	X	X	X
Gas Cylinder	Once		⊗	⊗	⊗
Health & Safety Orientation	Once	X	X	X	X
Hydrogen Fluoride	3 yr		⊗	⊗	
Machine Guarding Awareness	3 yr			⊗	X
Slips, Trips & Falls	5 yr	X	X	X	X
Violence & Harassment Prevention in the Workplace	3 yr	X	X	X	X
WHMIS 2015 ~	5 yr	X	X	X	X
Other Specific Training	Various	⊗	⊗	⊗	⊗

Legend
X Mandatory
* Mandatory if currently working on campus or before your return to campus for work purposes.
⊗ Required if working with the hazard or supervising staff who work with the hazard
~ As New products, equipment and technology take place training is required
All training to be completed as soon as practicable upon hire and prior to working with hazard.
Supervisors may request at their discretion the worker to complete refresher training of the current health and safety courses offered by the University on a more frequent basis as is deemed necessary, ie. conditions change, new information or hazards are introduced.
Supervisors please note RMM #300 (Safety Training & Orientation) all undergraduate students (and placement students) shall have safety orientation training prior to commencing labs

Workplace Hazardous Materials Information System (WHMIS)

The Workplace Hazardous Materials Information System (WHMIS) is a comprehensive national system for safe management of hazardous chemicals, which is legislated by both the federal and provincial jurisdictions.
The WHMIS legislation makes it mandatory that all employees attend a short course (approximately three hours in duration), which will provide basic information. WHMIS is for individuals handling chemicals working in a lab environment. It is intended to provide necessary and required training to all who use department laboratories. WHMIS is mandatory training for anyone working with or in the proximity of hazardous materials.

The WHMIS legislation provides that workers must be informed about the hazards in the workplace and receive appropriate training to enable them to work safely. To accomplish this, WHMIS requires all suppliers (manufacturers, importers, packagers and processors) to label and prepare Material Safety Data Sheets (MSDSs) (or Safety Data Sheets (SDSs)) for products they make, import, package, or process that meet the hazard criteria set out in the Controlled Product Regulations under the Federal Government's Hazardous Products Act. The buyers of these controlled products must make sure that these products are correctly labeled and that MSDSs are available. Employers must set up worker

education programs that instruct workers about the contents and significance of labels and MSDSs and how to work safely with hazardous materials.

In summary, WHMIS delivers the necessary information by means of:

- Cautionary labels on containers of controlled products
- The provision of an MSDS for each controlled product
- A worker education program

The ultimate goal is to create a safer workplace by providing workers with the knowledge and tools to enable them to work safely.

Job Hazard Analysis Form

Prior to commencing work (research-related or TA-related), a job hazard analysis (JHA) of your main activities must be completed and reviewed with your supervisor (research) or instructor (TA) to identify hazards and determine health and safety training requirements. The program is documented in in McMaster's Risk Management (RMM) Number 324. This document is mandatory reading. You are encouraged to make an appointment with your supervisory to specifically discuss the roles, responsibilities, procedural guidelines, record keeping and mandatory safety training matrix. It is available as a PDF and can be downloaded from the Human Resources website:
https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/

A job hazard analysis is essential in clarifying the work to be done in conjunction with the hazards and controls that are associated with the activity. Each main activity involved with job requires a hazardous analysis, where common hazards and associated controls, are identified. The goal is always to eliminate the hazard, However, if a hazard cannot be eliminated, then it needs to be minimized before the work is performed. Hazards can be minimized by implementing controls such as personal protective equipment, written procedures or training. The JHA involves the review of existing (online), and newly created ones (offline) when required, JHA forms. To document that this analysis has been performed, a summary sheet listing all of the online JHA forms analyzed, complete with a hard copy of all newly created JHA forms, needs to be signed by both you the researcher/TA and your supervisor/instructor. You should retain a copy along with your supervisor/instructor. Existing JHA forms, along with detailed instructions of how to create a JHA form are available on the Human Resources website:
https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/

McMaster University Laboratory Manual 2019

This manual is intended to provide basic rules for safe work practices in a laboratory. The procedures may be supplemented with Standard Operating Procedures (SOP) where applicable and with information on roles, responsibilities and specific procedures outlined in the university's Risk Management Manual (RMM). This is mandatory reading for all employees, graduate students and volunteers working in laboratories. This manual applies to all campus labs. The manual is available on the human resources website:
https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/lab-safety/

Reporting of a Safety Incident

Any incident, whether it did or could have, resulted in injury must be reported to the department immediately. Please advise your supervisor/instructor as soon as possible and complete the online Injury/Incident Report. This form is available on the Human Recourses website:
https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/

Fire Safety Procedure

In the case of fire, or the sounding of an alarm, **"Get Out And Stay Out"**. You should be at least 50 feet away from the building and not return until the "All Clear" is given. Department Fire Wardens have been designated and can be identified by orange vests.

Security

Please be security conscious. Do not leave personal valuables in your office or desk. Keep all books, notes, etc. locked in your locker. Do not share your keys or invite others to the graduate student offices or other department facilities. So that no rooms are left unattended, the last person leaving an office should lock the door. Do not give your copier code to anyone. Do not reveal your computer password to anyone. If you suspect that it is compromised, change it immediately.

Emergency

The McMaster Security office is located in E. T. Clarke 201 and can be contacted at ext. 24281. This office is responsible for overall security on campus. In addition they operate a Lost and Found service (ext. 23366). Any lost items will be held by them for 60 days. ****IN CASE OF EMERGENCY DIAL 88***

Graduate Courses Requirements

The requirements listed below only apply to in-coming graduate students with a September 2020, January 2021 or May 2021 start. For in-course graduate students, please refer to the graduate course requirements stated in the School of Graduate Studies Calendar and the department's Graduate Student Handbook issued for the academic year of your start. For example, if you started in September 2017, January 2018 or May 2018, then the School of Graduate Studies Calendar and the department's Graduate Student Handbook for the 2017-2018 academic year needs to be consulted. In the event of a discrepancy between the information provided in the Graduate Student Handbook and the School of Graduate Studies Calendar, the latter prevails.

MASc Degree (Materials Science and Engineering)

Graduate students are required to successfully complete at least 12 units of course work, which must include the mandatory seminar half course (3 units) MATLS 701. Courses at the 700-level are offered as either a half course (3 units) or a quarter course (1.5 units). Only one 600-level course is allowed for graduate course work credit. Courses offered at the 600-level are offered as half courses (3 units)Only one non-technical half course (3 units) is permitted with written approval from the supervisor.

The passing grades for a graduate level course are A+, A, A−, B+, B, and B−.

PhD Degree (Materials Science and Engineering)

Graduate students entering the PhD program are required to successfully complete at least 12 units (4 half-courses) of course work, which includes the mandatory seminar course MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units). Only one 600-level course is permitted for graduate credit. Courses offered at the 600-level are offered as half courses (3 units). Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the supervisor.

Graduate students who have successfully transferred to the PhD program from the Master's program in the Department are allowed to count the course work that they completed as a MASc student towards their course requirements for the PhD program.

The passing grades for graduate level course are A+, A, A−, B+, B, and B−.

Department Course Offerings 2020-2021

Table 5 lists the graduate course that will be offered by the Department during the 2020-2021 academic year. Overview descriptions and outlines for these courses are available on the Department website:
https://www.eng.mcmaster.ca/materials/programs/course-listing#graduate

Table 5: Department Course Offerings for the 2020-2021 Academic Year

Fall Term (Term 1)			**Winter Term (Term 2)**		
ENG 4T04	3 Units	Materials Selection and Design	MATLS 6C03	3 Units	Modern Iron & Steelmaking
MATLS 6D03	3 Units	Corrosion and Its Control	MATLS 701	3 Units	Graduate Seminar (MASc)
MATLS 6I03	3 Units	Sustainable Manufacturing	MATLS 702	3 Units	Graduate Seminar (PhD)
MATLS 701	3 Units	Graduate Seminar (MASc)	MATLS 725	3 Units	Transmission Electron Microscopy
MATLS 702	3 Units	Graduate Seminar (PhD)	MATLS 730	1.5 Units	XRD2 & XRD3 Diffraction Methods for Materials
MATLS 715	3 Units	Solidification Processing	MATLS 751	3 Units	Mechanical Properties Material
MATLS 724	3 Units	Materials Characterization			
MATLS 734	1.5 Units	X Ray Theory			

Note that the course enrollment process will automatically assign a course towards the primary academic program that a graduate student is enrolled in for a particular term. This process does not determine whether the course will exceed the requirements outlined in the curriculum. Where graduate students wish to designate a particular course towards a program other than their primary academic program a Request for In-Program Course Adjustments form is required during the normal add period outlined in the sessional dates. The form is available on the School of Graduate Studies website:
https://gs.mcmaster.ca/sites/default/files/resources/in-program_request_form_february_2019.pdf

Courses Outside Department

Graduate students are normally required to complete their course degree requirements by taking courses from within their program (Department of Materials Science and Engineering). As a minimum, at least 50% of courses taken must be listed or cross-listed by the Department's (Materials Science and Engineering) program in order to be counted towards your degree. Graduate students are encouraged to consult with their supervisor to select some of their courses from areas beyond the focus of their research, including courses offered outside of the department. For courses to be taken for credit outside of the department, but within the Faculties of Engineering, Science and Health Science, written approval from the supervisor is required (to be submitted to the Graduate Administrative Assistant for record keeping purposes). For any other courses to be taken for credit require approval from the Associate Dean – Graduate Studies (Engineering).

The passing grades for all graduate courses outside of the Department are A+, A, A−, B+, B, and B−.

Extra Courses (Extra Course)

This category identifies courses that a graduate student takes (with the approval of the supervisor) that are not necessary to meet the course requirements for the degree program. In order to designate a course as extra, graduate students need to submit a Request for In-Program Course Adjustments during the normal add period of enrollment in a particular term. The form is submitted to the program office and once approved will have the designation added to the enrollment record for that course only. If a failing grade (i.e. less than B−) is received in a course taken as Extra, the

courses (and grade) will not appear on the graduate student's transcript unless of academic dishonesty. Graduate students may petition to change the designation of an Extra Course to a MASc or PhD course prior to the deadline to drop a course provided that this change is supported by the supervisor and program and approved by the Associate Dean – Graduate Studies (Engineering). Changes of designation after the drop date will not be approved. The Request for In-Program Course Adjustments form is available on the Scholl of Graduate Studies' website: https://gs.mcmaster.ca/sites/default/files/resources/in-program_request_form_february_2019.pdf

Courses that are required by the supervisory committee or the Department Chair, as additional requirements in excess of the stated minimum for the program, must be designated as a MASc or PhD course.

The passing grades for an Extra Course are A+, A, A−, B+, B, and B−.

Failing Grades and Incomplete Grades

The minimum passing grade in a graduate course is a B−. Failure in a course (or any program milestone in general) is reviewed by the Associate Dean – Graduate Studies (Engineering). More information is available in the academic calendar:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734

SGS 700 Research/Writing (Full-Time)

Mosaic requires graduate students to be enrolled in a course, in every term that they are an active student. If there is a term in which graduate students are not taking a course, they need to enroll in the SGS 700 course. If graduate student are not enrolled in this course during a term in which they are not taking any other course, Mosaic will classify them as no longer being active and this will prevent them from moving onto the next academic year. It will also make a transcript read incorrectly, should graduate students need transcripts for scholarships or applications to other degree programs. This does not apply to graduate students who are on a leave of absence.

Once graduate student enroll in the SGS 700 course for a given term, they cannot add another course to that term. Should they change their minds and want to take a course while enrolled in SGS 700, graduate students must first drop the SGS 700 course before the system will allow them to add anything else.

Graduate student fees in the department are assessed on a per-term basis.

Mandatory Course Requirements

MSE Graduate Seminar (MATLS 701/702) – Attendance is Mandatory

The Department holds a regular meeting, which incorporates the Graduate Seminar, featuring oral presentations by registered graduate students (MATLS 701 or MATLS 702) and by visitors and fulltime researchers.

Each student is required to prepare and present a major seminar, based upon extensive research work and literature surveys, on any topic of current research interest in Materials Science and Engineering. A pass/fail grade will be assessed based on overall performance in the course.

MATLS 701 (MASc)

- One (1) seminar required, usually in Year 2 of program
- Enroll in Mosaic
- Watch for communication from the Graduate Administrative Assistant

MATLS 702 (PhD)

- Two (2) seminars required, usually in Year 2 and Year 4 of program
- Registration with the Graduate Administrative Assistant is required for first (1st) seminar (do not enroll in Mosiac)

- Enroll in Mosaic for second (2nd) seminar
- Watch for communication from the Graduate Administrative Assistant

NOTE: There is a permission placed on the course when enrolling in Mosaic simply to prevent students from registering for this course more than they need to.

Career Planning – Mandatory

Graduate students are required to complete a career planning exercise within the first three terms (12 months) of full time study. Graduate students will participate in a planning session with a career specialist within the faculty and subsequently produce a report before completion of the first three terms (12 months) of full time study. The report must be submitted to the Graduate Administrative Assistant for approval by the Associate Chair (Graduate).

SGS Mandatory Courses: SGS 101 / SGS 201

Graduate students are required to complete the following two (2) on-line courses available within Avenue to Learn (A2L), McMaster's web-based course management system, within their first academic term:

- SGS 101 – Academic Research Integrity and Ethics
- SGS 201 – Accessibility for Ontarians with Disabilities Act – AODA Training

Anyone who has not completed either of the following courses by the deadline provided by SGS will be automatically assigned an F grade. Each course takes approximately one hour to complete and consists of watching an online presentation followed by a test.

Check your Mosaic Student Centre to ensure that you are registered in these courses. If they do not appear in your course schedule or in Avenue to Learn, please contact the School of Graduate Studies (SGS) at sgsrec@mcmaster.ca

Notes

- Passing grade for SGS 101 is 14/20 and students have three (3) attempts.
- Passing grade for SGS 201 is 6/6 and currently there is no limit to the number of attempts.
- Graduate students who have taken SGS 101 and 201 for a previous graduate degree do not need to take the course again.
- Graduate students, who have taken an AODA equivalent course, either previously at McMaster (e.g. undergraduate welcome week representative) or at another institution, may be exempt from taken SGS 201. They should contact aoda@mcmaster.ca to confirm that the course in question is an OADA equivalent course. Once confirmation is provided, it needs to be forwarded to sgsrec@mcmaster.ca.

MASc Degree Requirements (Excluding Course Work)

Supervisory Committee Meeting (SCM)

MASc students are assigned a supervisory committee that consists of their supervisor plus one other faculty member (typically one from the Department). Members external to the University need to nominated by your supervisor and be approved by the Associate Dean – Graduate Studies (Engineering). MASc students are required to meet with their supervisory committee at least once during their program. The objective of the meeting is to assess progress towards meeting degree requirements and set goals to complete all degree requirements. This meeting needs to take place by November 30, 2021, regardless of the program start date (see Table 6). This deadline is set by the School of Graduate Studies. It is best to arrange this meeting well in advance of this deadline to ensure compliance. For MASc students who enter the program as an accelerated student, this review should take place soon after admission in the MASc program to help them get started. Part-time MASc students must have a meeting by the November 30, 2021 deadline.

Table 6: MASc Supervisory Committee Meeting Deadline (2020-2021)

Program Start Date:	***SCM Deadline:***
Prior to September 1, 2020	November 30, 2020
September 1, 2020	November 30, 2021
January 1, 2021	November 30, 2021
May 1, 2021	November 30, 2021

Students are expected to arrange the meeting with their supervisory committee members. The meetings typically consists of a 15-20 minute presentation given by the student that updates the supervisory committee on the progress made towards completing all degree requirements with an emphasis on the research progress made. The presentation is followed by an informal question period and then a goal setting discussion. The meeting is concluded by the submission of a report, which requires input from the student and the supervisor and signatures of all three. The report is a hardcopy that needs to be submitted to the Administrative Assistant – Graduate. The form is available on the Faculty of Engineering website:
https://www.eng.mcmaster.ca/sites/default/files/masc_supervisory_report_february_2018.pdf

Thesis Defense Examination

This is an oral exam administered by the Department. This is a public examination open to all interested persons. It is conducted by a minimum of three faculty members (including the supervisor and the other supervisory committee member). The exam covers material presented in the written thesis and the background material to the submitted thesis. It is normally taken by students who intend to leave the program upon completion of their MASc degree.

The exam consists of a short (20 minutes maximum) oral presentation that is followed by a question period where the student is asked to defend the contents and background to the written thesis. The question period (typical no more than 100 minutes) involves two rounds of questions with the majority of time being spent in the first round. Each of the three examiners will be allotted equal time to ask questions. Upon conclusion of the exam, the student is asked to leave the exam so that an assessment of the defence can take place in camera. After a discussion of the examination, the chair will ask for a vote on the success or failure of the defence. If the examiners approve the defence, the chair will ask the examiners to complete the Examination Report by initialing appropriately. The student will be invited back to the exam for congratulations by the committee. In the event that minor revisions are required to the thesis, the chair of the examination committee is responsible for ensuring that (1) the student is advised of the revisions, (2) the student receives and understands the 'Final Thesis Submission form' to be used by the supervisor to confirm that the revisions have been made, and (3) the supervisor is also aware of the form. The chair will complete and sign the Examination Report and return it to the Graduate Administrative Assistant, whom will return it to the School of Graduate Studies.

However, if there are two or more negative votes, the student will be deemed to have failed the defence, and a reconvened oral defence must be held at a later date. The student should be told as clearly as possible by the chair and the examining committee what he/she must do to improve the defence. The reconvened defence is the student's final opportunity to complete the degree. Membership on the reconvened examining committee is typically the same as that for the original defence. If the defence fails a second time, that decision is final, and is not open to appeal.

After a successful defence, the student must correct any errors identified in the written report identified by the examination committee to the satisfaction of the supervisor and then submit an electronic copy to the School of Graduate Studies via MacSphere. Students are normally expected to submit their final thesis within four weeks of a successful defence. More information is available in the School of Graduate Studies Calendar 2020-2021:
https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8734#2.8.3_Publication_of_Electronic_Theses_at_McMaster_University

Please consult the School of Graduate Studies website and the School of Graduate Studies' Guide for the Preparation of Master's and Doctoral Thesis for this specific information:
https://gs.mcmaster.ca/current-students/completing-your-degree/

Urkund

Effective January 31, 2021. Prior to the thesis defence the entire document must be reviewed for its originality using the University's paid subscription to Urkund. The program/supervisor will review the originality report generated by Urkund and either recommend changes to the document or approve it for the defence. A thesis may not be seen by the thesis examining committee until the Urkund generated report was reviewed and approved by the supervisor or the program, unless authorized by the Associate Dean of Graduate Studies.

Initiating Master's Defence

MASc students need to initiate the transfer examination by emailing Graduate Administrative Assistant a minimum of six weeks in advance of the proposed examination date stating the working title and supervisory committee members. The Associate Chair – Graduate will then assign a chair (typically another faculty member within the Department) for the defence. A PDF version of the thesis must be sent to the members of the examination committee at least two weeks in advance of the scheduled examination.

Tuition fees continue to be assessed until all degree requirements are met, including the successful submission of the final approved thesis to MacSphere. **It is the student's responsibility to ensure they have met course requirements and milestone completions before initiating the defence.**

Transfer Exam from Master's to PhD

MASc students wishing to be transferred to the PhD program prior to the completion of the MASc degree (see section 2.1.3 of the General Regulations of the Graduate School) must submit and successfully defend a written transfer report embodying a statement of progress and achievement in the research to date and a proposal for the PhD research. Typically a transfer examination is completed by the end of the fifth term (20 months) after initial registration in the MASc program: to help ensure the graduate student does not go overtime while attempting to transfer. Approval to transfer from the MASc program to the PhD program will be determined through a closed (non-public) oral examination in defence of the submitted written Transfer Report.

The transfer report should take the form of a literature review plus some preliminary results and analysis followed by a detailed research proposal (objectives, methodology and anticipated significance). The literature review should not simply catalogue the papers in the field. Rather it should offer some insight into the state of the field (i.e. what are the main advances achieved, what are the main shortcomings, what is good or bad about the approaches taken by previous workers). This should lead into a discussion of what approach you intend to take in your own research. What will you want to do different from previous research, and what advances in the state-of-the-art do you hope to achieve? Some discussion of the techniques you expect to use will be important. You will be expected to demonstrate that you have thought about how best to approach your problem, and what the associated limitations may be. The report need not, and indeed should not, be a lengthy document. It should indicate that you have a good grasp of the background to the project being undertaken, have demonstrated a potential to perform research, and have thought carefully about the research being proposed.

The oral exam is administered by the Department. The exam committee is comprised by five faculty members (including the supervisor the other MASc supervisory committee member). The exam covers material presented in the written transfer report and the background material to the proposed research. The purpose of this exam is to determine whether the student has a good chance of successfully completing a PhD It also serves the valuable function of providing a good appraisal of the problem chosen for research. The exam itself consists of a short (20 minutes maximum) oral presentation that is followed by a question period where the student is asked to defend the transfer report contents and

background to the proposed research. The question period (typical no more than 120 minutes) involves two rounds of questions with the majority of time being spent in the first round. Each of the five examiners will be allotted equal time to ask questions. Upon conclusion of the exam, the student is asked to leave the exam so that an assessment of the defence can take place in camera. After a discussion of the examination, the chair will ask for a vote on the success or failure of the transfer. If the examiners approve the transfer, the chair will ask the examiners to complete the transfer examination report by initialing appropriately. The student will be invited back to the examination room for congratulations by the committee.

However, if there are three or more negative votes, the student will be deemed to have failed the transfer exam and a reconvened oral exam must be held at a later date. The student should be told as clearly as possible by the chair what he/she must do to improve defence of the transfer. The reconvened oral exam is the student's final opportunity to complete the transfer. Membership on the reconvened examining committee should be the same as that for the original exam. If the exam fails a second time, that decision is final, and is not open to appeal. The student is then expected to complete the MASc degree by submitting a written thesis and defending it in an oral defence exam.

So what is required of a potentially good PhD student? Obviously knowledge as such has some importance, but it is not of prime importance. In asking students to write a research proposal, we essentially are asking them to ask themselves questions such as:

- *Why am I doing this research, i.e. what is the essence of the problem? How does my proposal relate to previous work?*
- *What form of measurement will I use or what theoretical basis will I assume?*
- *Do I really understand this form of measurement, i.e. the basic science behind it, the accuracy and sensitivity required, etc?*
- *What alternative measurements or techniques could I use and why have I rejected them in favour of the one proposed?*
- *Can the problem be modeled, and on what basis?*

In short, does the student have the interest and capability of a scientist or engineer who can analyze a problem with complete understanding, or is the student prepared only to look at it superficially, with uncritical adoption of other people's opinions? Of course, the answers to everything cannot be known or there would be no point in doing the research, but the questioning by the student of what is important, should have been done. A PhD degree demands maturity on the part of the student and the student should be able to take over the problem from the supervisor. It is, after all, an indication of the ability to do independent research.

Initiating a Transfer Examination

MASc students need to initiate the transfer examination by emailing Graduate Administrative Assistant a minimum of six weeks in advance of the proposed examination date stating the working title and supervisory committee members. The Associate Chair – Graduate will then assign a chair (typically another faculty member within the Department) for the defence. A PDF version of the transfer report must be sent to the members of the examination committee at least two weeks in advance of the scheduled examination.

PhD Degree Requirements (Excluding Course Work)

Supervisory Committee Meeting (SCM)

PhD students are assigned a supervisory committee that consists of their supervisor plus two other faculty members (typically ones from the Department). Members external to the University need to nominated by the supervisor and be approved by the Associate Dean – Graduate Studies (Engineering). PhD students are required to meet with their supervisory committee on an annual basis (a minimum of four times over the typical length of the PhD program). The

objective of the meetings is to assess progress towards meeting degree requirements and to set goals to complete all remaining degree requirements. The required meeting for the 2020-2021 academic year needs to take place by November 30, 2021. For PhD students starting in the 2020-2021 academic year, this date is fixed regardless of the program start date (see Table 7). This deadline is set by the School of Graduate Studies. It is best to arrange this meeting well in advance of this deadline to ensure compliance.

Table 7: PhD Supervisory Committee Meeting Deadline (2020-2021)

Program Start Date:	***SCM Deadline:***
Prior to September 1, 2020	November 30, 2020
September 1, 2020	November 30, 2021
January 1, 2021	November 30, 2021
May 1, 2021	November 30, 2021

Students are expected to arrange the meeting with their supervisory committee members. The meetings typically consists of a 15-20 minute presentation given by the student that updates the supervisory committee on the progress made towards completing all degree requirements with an emphasis on the research progress made. The presentation is followed by an informal question period and then a goal setting discussion. The meeting is concluded by the submission of an online (Mosaic) report, which requires input from the student and the supervisor and approvals of all three. Access to online (Mosaic) form needs to be initiated by the Administrative Assistant – Graduate. A step-by-step guide is available on the Department website:
https://www.eng.mcmaster.ca/materials/resources#graduate-students

Comprehensive Examinations

Comprehensive exams are meant to test the student's background understanding in various areas of materials science and engineering. It is important to realize what is expected of you in this type of examination. First of all, they are not designed simply to see how much you have remembered from your undergraduate program, although knowledge of key terminology and basic facts is important. These exams will test your ability to think and to question, and to elaborate fundamental concepts. The questions will probe your ability to work with and develop concepts. Therefore, it is the process, which is important, as much as the result. Always keep this in mind during the examination. Do not be concerned if you do not immediately know the final answer to a question you are asked. Start with some basic concept or a simple first order equation and work towards the solution. This will demonstrate to the committee your ability to think and to develop concepts. Make extensive use of the blackboard to draw simple diagrams or to write down equations. As you prepare for these exams, try to develop a good fundamental understanding of basic concepts, and you should do well.

Part I Comprehensive Exam

The part 1 comprehensive exam is designed to ensure that all students who receive a PhD degree in materials science and engineering have a broad understanding of the foundations of the discipline. The key to this approach is an emphasis on fundamental concepts. PhD students will not be expected to demonstrate a very detailed knowledge of materials processes, or of the properties of any given material. However, they will be expected to understand the broad classes of materials - how their underlying structure controls properties and affects the approaches used to process them and so forth.

It is considered essential that students demonstrate an appreciation for the interrelationships between structure/properties/processing of materials. The content that students must be able master is best illustrated by referring to sections in classical textbooks. Students are of course free to study use other books with which they are more comfortable. **However, the book and chapters listed in Appendix A offer guidance as to both the nature and the depth of the content required for the part 1 comprehensive examination**. Note that the topics are divided into core

areas that all students are responsible for and elective areas that students choose to be responsible for. Elective areas include the choice (structure) between (i) crystalline solids and (ii) amorphous solids and the choice (properties) between mechanical properties, (ii) thermal and electrical properties, and (iii) chemical properties. The part 1 comprehensive exam is typically scheduled in the second term of the PhD program (see Table 8).Students will receive notice from the Administrative Assistant – Graduate about six weeks prior to the exam date. Students may arrange to take the part 1 comprehensive exam at an earlier time following discussion with their supervisor.

Table 8: Part 1 Comprehensive Examination Timeline

Admission Entry Date	*Expected Exam Timing:*
September 1, 2020	January 2021/February 2021
January 1, 2021	May 2021/June 2021
May 1, 2020	September 2021/October 2021

This is an oral exam, which is comprised solely of a question and answer session (typically one hour). The examination committee is comprised of three faculty members (typically from within the Department). Each of the three examiners will be allotted equal time to ask questions. Upon conclusion of the exam (single round of questioning), the student is asked to leave the exam so that an assessment can take place in camera. After a discussion of the examination, the chair will ask for a vote on the success or failure of the exam. The results will be communicated to the student shortly thereafter via an email sent by the Administrative Assistant – Graduate. The outcomes are pass or fail. A failing grade requires that the exam be reconvened at a later date (typically within four weeks). The chair will inform the student the specific topics that require an improved fundamental understanding. The reconvened exam is the student's final opportunity to pass the part 1 comprehensive exam. A fail on the reconvened exam is final and not open to appeal.

Part II Comprehensive Exam

The Part II comprehensive exam is centered about the research area of the student. The breadth of the exam will include areas that are required by the student in order to understand all the aspects of the student's research and its possible applications. The topics on which the exam is to be based are set by the supervisory committee. The three research areas are typically discussed and agreed upon during the supervisory committee meeting held prior to the part II comprehensive exam. The exam should take place during the third year (terms seven through nine) of the PhD program. Students initiate the exam by emailing the Administrative Assistant – Graduate a minimum of six weeks in advance of the proposed exam date stating the supervisory committee members and a list of agreed upon research areas for examination. The examining committee, to be appointed by the Associate Chair – Graduate, typically consists of the three supervisory committee members, and one additional faculty member (typically from within the Department), who will chair the committee.

The exam is an in-depth oral exam lasting two to three hours. It starts with a short (20 minutes maximum) oral presentation of the student's research objectives, methodology, major results and discussion of their significance. The presentation is followed by a question period that is the exam. Students are probed about their breadth and depth of knowledge pertaining to three research topic areas. The question period involves two rounds of questions with the majority of time being spent in the first round. Each of the four examiners will be allotted equal time to ask questions. Upon conclusion of the exam, the student is asked to leave the exam so that an assessment of the exam can take place in camera. After a discussion of the examination, the chair will ask for a vote on the success (pass) or failure of the exam. The student is then invited back into the exam for the verdict and feedback. If the verdict is fail (two or more votes to fail), then the exam will be is reconvened at a later date (typically within four weeks). The reason(s) why the student failed will be clearly communicated by the chair so that students can focus on these shortcomings for the reconvened exam. The reconvened oral exam is the student's final opportunity to complete the part II comprehensive exam. If the student fails the reconvened exam, that decision is final, and is not open to appeal.

Research Proposal Exam

PhD students are required to submit and defend a written proposal for their research program within the first three terms (12 months) of the program. The proposal report should take the form of a literature review plus some preliminary results and analysis followed by a detailed research proposal (objectives, methodology and anticipated significance). The literature review should not simply catalogue the papers in the field. Rather it should offer some insight into the state of the field (i.e. what are the main advances achieved, what are the main shortcomings, what is good or bad about the approaches taken by previous workers). This should lead into a discussion of what approach you intend to take in your own research. What will you want to do different from previous research, and what advances in the state-of-the-art do you hope to achieve? Some discussion of the techniques you expect to use will be important. You will be expected to demonstrate that you have thought about how best to approach your problem, and what the associated limitations may be. The report need not, and indeed should not, be a lengthy document. It should indicate that you have a good grasp of the background to the project being undertaken, have demonstrated a potential to perform research, and have thought carefully about the research being proposed.

The oral exam is administered by the Department. The exam committee is comprised by five faculty members, including the three members of the supervisory committee plus two more faculty members (typically from the Department). The exam covers material presented in the written proposal report and the background material to the proposed research. The purpose of this exam is to determine whether the student has a good chance of successfully completing a PhD. It also serves the valuable function of providing a sound appraisal of the problem chosen for research. The exam itself consists of a short (20 minutes maximum) oral presentation that summarizes the contents of the proposal report. The presentation is followed by a question period where the student is asked to defend the proposal and background to the proposed research. The question period (typical no more than 120 minutes) involves two rounds of questions with the majority of time being spent in the first round. Each of the five examiners will be allotted equal time to ask questions. Upon conclusion of the exam, the student is asked to leave the exam so that an assessment of the exam can take place in camera. After a discussion of the examination, the chair will ask for a vote on the success (pass) or failure of the exam. The student is then invited back into the exam for the verdict and feedback. If the verdict is fail (three or more votes to fail), then the exam will be is reconvened at a later date (typically within four weeks). The reason(s) why the student failed will be clearly communicated by the chair so that students can focus on these shortcomings for the reconvened exam. The reconvened oral exam is the student's final opportunity to complete the proposal exam. If the student fails the reconvened exam, that decision is final, and is not open to appeal. The student is then invited back into the exam for the verdict and feedback

So what is required of a potentially good PhD student? Obviously knowledge as such has some importance, but it is not of prime importance. In asking students to write a research proposal, we essentially are asking them to ask themselves questions such as:

- *Why am I doing this research, i.e. what is the essence of the problem? How does my proposal relate to previous work?*
- *What form of measurement will I use or what theoretical basis will I assume?*
- *Do I really understand this form of measurement, i.e. the basic science behind it, the accuracy and sensitivity required, etc?*
- *What alternative measurements or techniques could I use and why have I rejected them in favour of the one proposed?*
- *Can the problem be modeled, and on what basis?*

In short, does the student have the interest and capability of a scientist or engineer who can analyze a problem with complete understanding, or is the student prepared only to look at it superficially, with uncritical adoption of other people's opinions? Of course, the answers to everything cannot be known or there would be no point in doing the research, but the questioning by the student of what is important, should have been done. A PhD degree demands

maturity on the part of the student and the student should be able to take over the problem from his supervisor. It is, after all, an indication of the ability to do independent research.

PhD Defence

This is also an oral exam administered by the School of Graduate Studies. The examining committee includes members of the supervisory committee, members of the university from outside the department, and an external examiner from outside the university. After a short oral presentation, the student will be asked to defend the contents and background to the written thesis. This is a PUBLIC examination open to all interested persons. More information about the regulations for the PhD degree is available in the School of Graduate Studies Calendar 2020-2021: https://academiccalendars.romcmaster.ca/content.php?catoid=42&navoid=8736

Tuition fees continue to be assessed until all degree requirements are met, including the successful submission of the final approved thesis to MacSphere. **It is the student's responsibility to ensure they have met course requirements and milestone completions before initiating the defence.**

Please consult the School of Graduate Studies website and the School of Graduate Studies' Guide for the Preparation of Master's and Doctoral Thesis for this specific information:
https://gs.mcmaster.ca/current-students/completing-your-degree/

Urkund

Effective January 31, 2021. Prior to the thesis defence and, in the case of a doctoral thesis, before sending out the draft to the external examiner, the entire document must be reviewed for its originality using the University's paid subscription to Urkund. The program/supervisor will review the originality report generated by Urkund and either recommend changes to the document or approve it for the defence. A thesis may not be seen by the thesis examining committee (including the external reviewer in the case of a doctoral thesis) until the Urkund generated report was reviewed and approved by the supervisor or the program, unless authorized by the Associate Dean of Graduate Studies.

Sandwich Thesis

If some of the research undertaken expressly for the degree has previously been published or prepared by the student as one or more journal articles, or parts of books, those items may be included within the thesis subject to the School of Graduate Studies regulations and to obtaining permission from the supervisory committee. Please consult the Guide for the Preparation Theses for more detailed information on sandwich theses:
https://gs.mcmaster.ca/current-students/completing-your-degree/

All questions about PhD defence should be sent via email to the Thesis Coordinator at gthesis@mcmaster.ca

Course Work Requirements Summary

Master's Degree

- 12 units of course work: 9 units in addition to the mandatory MATLS 701 (3 units)
- 700 level courses are either a half (3 units) or quarter course (1.5 units)
- 600 level courses are offered as half courses (3 units) – only 1 permitted
- 50% of courses must be from offered by, or cross-listed with, the department (MATLS)
- Select course work after consultation and permission of your supervisor

Accelerated Master's Degree Option

- One work term during the spring/summer term with future MASc supervisor
- One 600 level course (3 units) in final year of undergraduate degree (counts towards undergraduate AND graduate degree)

- Complete either (i) MATLS 4KA3 and 4KB3 or (ii) additional work term during the spring/summer term with future MASc supervisor
- 6 units of course work (must all be at the 700 level) in addition to the mandatory MATLS 701 (3 units)
- 50% of courses must be offer by, or cross-listed with, the department (MATLS)

PhD Degree

- 12 units of course work: 9 units of course work in addition to mandatory MATLS 702 (3 units)
- 700 level courses are either a half (3 units) or quarter course (1.5 units)
- 600 level courses are offered as half courses (3 units) – only 1 permitted
- 50% of courses must be offered by, or cross-listed with, the department (MATLS)
- Select course work after consultation and permission of your supervisor

Degree Program Requirements Summary

Master's

TA Training Session (first time TA students only) – September 2020 or January 2021

- Mandatory – students are paid for TA training once

SGS 101 /SGS 201

- Complete by the end of the term that you started your program
- Courses are administered by the School of Graduate Studies

MATLS 701 Seminar Course

- Mandatory attendance for all students
- Must complete one seminar presentation during degree program

Career Planning Milestone Training & Report (CARP)

- Attend mandatory workshop in September 2020 or January 2021
- May students must attend September training
- Submit report to the Graduate Administrative Assistant by end of term

Supervisory Committee Meeting and Report

- Supervisor plus one additional member
- Written form report
- Incoming 2020-2021 students need to complete by November 30, 2021

Transfer Exam Option

- Transferring to the PhD program prior to completing a MASc degree
- Transfer report submitted and defended end of firth term (20 months) of program

Thesis Defence

- Complete by end of sixth term (24 months)
- Exam administered by the department
- Examining committee consists of the two supervisory committee members plus one other member appointed by the department

PhD Degree

TA Training Session (first time TA students only) – September 2020 or January 2021

- Mandatory – students are paid for TA training once

SGS 101 /SGS 201

- Complete by the end of the term that you started your program
- Courses are administered by the School of Graduate Studies

MATLS 702 Seminar Course

- Mandatory attendance for all students
- Must complete 2 seminar presentations during degree program

Career Planning Milestone Training & Report (CARP)

- Attend mandatory workshop in September 2020 or January 2021
- May students must attend September training
- Submit report to the Graduate Administrative Assistant by end of term

Supervisory Committee Meeting and Report – Annual Requirement

- Supervisor plus two additional members
- Online (Mosaic) report initiated by Graduate Administrative Assistant at student's request
- Incoming 2020-2021 students need to complete by November 30, 2021

Part I Comprehensive Exam

- During second term of degree program
- Examining committee appointed by the department

Research Proposal Exam

- Submit and defend written research proposal by end of the third term (12 months) of degree program
- Examining committee consists of the three supervisory committee members plus two other members appointed by the department

Part II Comprehensive Exam

- Completed before end of the ninth term (36 months) of degree program
- Examining committee consists of the three supervisory committee members plus one other member appointed by the department

Thesis Defence

- Completed by end of twelfth term (48 months) of degree program
- Exam administered by School of Graduate Studies

Quick Links

Materials Science and Engineering - https://www.eng.mcmaster.ca/materials

School of Graduate Studies - https://gs.mcmaster.ca/

International Student Services - https://studentsuccess.mcmaster.ca/international-students/

CUPE Local 3906, Unit 1 (TAs) - https://hr.mcmaster.ca/employees/labour-relations/cupe-local-3906-unit-1-tas/

Graduate Students Association - https://gsa.mcmaster.ca/

Student Accessibility Services - https://sas.mcmaster.ca/

Student Wellness Centre - https://wellness.mcmaster.ca/

2020-2021 Graduate Handbook Sign-off Sheet

I have read the MSE Graduate Handbook and reviewed the document with my supervisor. I understand that in the event of a discrepancy between the information provided in this handbook and the School of Graduate Studies Calendar, the latter prevails.

○ I have read the 2020-21 Graduate Handbook in its entirety.

○ I have met with my Supervisor prior to the start of term.

_____ _____

Student Name Date

_____ _____

Supervisor Date

Please return signed and completed form via email to Grad Admin.

APPENDIX A

Part 1 Comprehensive Exam Syllabus

Overview of thematic areas:

Core areas:

- **Structure of Materials** (including atomic structure and bonding and defect structures) - Callister[1] Chs. 2 and 4
- **Thermodynamics** (with emphasis on solution thermodynamics and phase equilibria) - Ragone[2] Chs. 1-5 and 7-9, Callister Ch 9 [Gaskell Ch. 2, 3, 7, 9, 11-13]
- **Kinetics** (including mass transfer and phase transformations) - Callister Chs. 5, 10

****Note that chapters may vary depending on textbook edition****

Elective Areas:

- **Structure of Materials.** Choose one of:
  - Crystalline solids - Callister Ch. 3
  - Polymeric solids - Callister Ch. 14

- **Properties of Materials.** Choose one of:
  - Mechanical properties - Callister Ch. 6, 7, 8
  - Electrical and thermal properties - Callister Ch. 18, 19
  - Chemical properties - Ragone Ch. 6

Detailed synopsis – key concepts

While the following is not meant to be an exhaustive list of topics that might be raised, it lists key concepts with which you should be familiar.

1. **Structure of Materials**
   a. Atomic structure and bonding – Callister Ch. 2
      i. Atomic bonding forces and energies
      ii. Bonding types
      iii. X-ray analysis for chemical composition determination
   b. Crystalline solids – Callister Ch. 3
      i. Concept of a crystal, unit cell
      ii. Common structures including fcc, bcc, hcp, tetragonality
      iii. Miller indices for directions and planes
      iv. Physical basis of x-ray diffraction and Bragg's law
      v. Meaning of crystalline anisotropy
   c. Defect structures – Callister Ch. 4
      i. Vacancies
         1. Thermodynamic properties
         2. Vacancy concentration
      ii. Dislocations (edge, screw, mixed)

[1] William D. Callister, Jr., *Materials Science and Engineering An Introduction*, 6th Ed., 2003, Wiley.
[2] David V. Ragone, *Thermodynamics of Materials Vol. 1*, 1995, Wiley. has been selected as the primary source for this material because it is fundamental and concise. However, many students may be more familiar with David R. Gaskell, *Introduction to the Thermodynamics of Materials,* 3rd Ed., 1996, Taylor and Francis, so cross-references are made in square brackets.

iii. Interface defects (free surfaces, low and high angle grain boundaries, twin boundaries)

d. Polymeric solids – Callister Ch. 14
   i. Structure of common monomers (e.g. alcohols, ethers, acids, aromatic hydrocarbons)
   ii. Basic concepts in polymers (homo- and co-polymers, functionality
   iii. Molecular weight
   iv. Polymer types (linear, branched, crosslinked, network)
   v. Thermosets vs. thermopolymers, effect of basic properties
   vi. Crystallinity in polymers
   vii. Characterization of polymer structure

2. Thermodynamics

a. First Law of Thermodynamics – Ragone Ch. 1 [Gaskell Ch. 2]
   i. Energy as a State Function
   ii. Work
   iii. Intensive and Extensive Properties
   iv. Enthalpy
   v. Heat Capacity
   vi. Ideal Gases
   vii. Enthalpies of Formation and Chemical Reaction
b. Second Law of Thermodynamics – Ragone Ch. 2 [Gaskell Ch. 3]
   i. Entropy as a State Function
   ii. Adiabatic, Reversible and Steady State Systems
   iii. Entropy Changes in Chemical Reactions and the Third Law
c. Equilibrium – Ragone Ch. 4 [Gaskell Ch. 7]
   i. Phase Equilibria
   ii. First and Second Order Transitions
d. Chemical Equilibrium – Ragone Ch. 5 [Gaskell Ch. 11 & 12]
   i. Thermodynamic Activity
   ii. Gaseous and Solid-Vapour Equilibria
   iii. Ellingham Diagrams
e. Solutions – Ragone Ch. 7 [Gaskell Ch. 9]
   i. Partial Molar Quantities
   ii. Ideal and Non-ideal Solutions
   iii. Raoult's and Henry's Laws
   iv. Regular Solutions
f. Gibbs' Phase Rule – Ragone Ch. 8 [Gaskell Ch. 13.4]
g. Phase Diagrams – Ragone Ch. 9 [Gaskell Ch. 12]
   i. The Lever Rule
   ii. Miscibility and Immiscibility
   iii. Binary phase diagrams – Callister Ch. 9
      1. Types (isomorphous, eutectic/eutectoid, peritectic/ peritectoid)
      2. Congruent transformations
      3. Phases and compositions

3. Kinetics

a. Mass transfer – Callister, Ch. 5
   i. Mechanisms of atomic diffusion (vacancy, substitutional, interstitial)
   ii. Steady-state diffusion, Fick's 1st Law
   iii. Transient diffusion, Fick's 2nd Law
   iv. Characteristic diffusion length
   v. Applications to carburization
   vi. Impurity diffusion – vacancy, substitutional and interstitial

b. Microstructure development – Callister, Ch. 9
    i. Effect of cooling rate on microstructure
    ii. Fe-C phase diagram
        1. Phases
        2. Microstructure
c. Phase transformations – Callister Ch. 10
    i. Concept of chemical equilibrium, application to phase formation
    ii. Thermodynamics of phase nucleation
    iii. Homogeneous vs. heterogeneous nucleation
    iv. Transformation kinetics, Avrami equation
    v. Fe-C system
        1. Kinetics of pearlite formation
        2. TTT diagrams
        3. Metastable phases – bainite, martensite
        4. Effect of alloying – hardness vs. hardenability
        5. Tempering
    vi. Precipitation processes
        1. Precipitate growth by diffusion
        2. Age hardening

4. Properties of Materials

a. Mechanical properties – Callister Chs. 6-8
    i. Definition of stress and strain
    ii. Elastic response (Hooke's law, elastic moduli)
    iii. Tensile stress-strain curve and related parameters for strength and ductility
    iv. Basic dislocation concepts (Burger's vector, slip systems, deformation due to slip)
    v. Strengthening mechanisms (grain size, solute, work hardening, etc.)
    vi. Recovery and recrystallization
    vii. Ductile vs. brittle fracture
    viii. Fracture toughness, Griffith relationship
    ix. Ductile – brittle transition in steels
    x. Basic concepts in creep and fatigue
b. Electrical properties – Callister Ch. 18
    i. Ohm's law
    ii. Band structure of metals, insulators and semi-conductors
    iii. Conduction in terms of band structure and bonding models
    iv. Electron mobility
    v. Electrical resistivity of metals
    vi. Semiconductivity
        1. Intrinsic
        2. Extrinsic: n-type and p-type
        3. Temperature dependence of conduction in semiconductors
    vii. Capacitance
        1. Polarization
        2. Dielectric materials
c. Thermal properties – Callister Ch. 19
    i. Heat capacity
        1. Specific heat at constant volume & pressure
        2. Atomic and electronic mechanisms of heat capacity
    ii. The basis of thermal expansion

iii. Thermal conductivity
    1. Fourier's law
    2. Applications to steady-state heat transfer
iv. General ranking of different materials in terms of specific heat, thermal expansion and thermal conductivity

d. Chemical properties – Ragone Ch. 6 [Gaskell Ch. 14]
i. Electrochemical Cells
ii. Half Cell Reactions
iii. Nernst Equation
iv. Pourbaix Diagrams
v. Concentration Cells