Department of Mechanical Engineering
Faculty of Engineering
McGill University

HONOURS PROGRAM STUDENT HANDBOOK

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This Honours Program Handbook explains the specifics of the Honours program and its differences with the Regular program. It should be viewed as a supplement to Undergraduate Student Handbook which still applies to a large extent to Honours students.

1. General Outline of the Honours program

The Honours program is a special program in the Department of Mechanical Engineering designed for top-level students who wish to try their hand at an individual research project under supervision of a Mechanical Engineering professor. It would be pertinent to name it alternatively as a Research-Oriented program or a Bachelor Thesis program. The research project results in an Honours (Bachelor) thesis and culminates in Honours presentations. The Honours program gives more emphasis to fundamental, analytical disciplines with advanced courses to be chosen from a suggested selection of courses. The program is particularly suitable for those with a high aptitude in mathematics and physics and gives a thorough grounding in the basic engineering sciences. It is considered to be a good, although not mandatory, steppingstone towards graduate studies (Master (Thesis) and PhD).

Even though in the Honours Program there is a certain shift towards more fundamental studies (as opposed to applied/design component), it still satisfies fully the requirements of Canadian Engineering Accreditation Board (CEAB) and thus produces full-fledged engineers. Typical enrollment in the Honours stream is ~30-40 students in total (from U2 to U4).

2. Differences with the Regular program

The Honours Program curriculum corresponds to Stream C. For more details on the program, you may also visit McGill eCalendar.

The main difference between the curricula of the Honours program and the Regular program is that instead of the capstone design two-term team project (MECH 463, 6 credits) in the Regular program Honours students carry out a two-term individual research project (MECH 403N1/D1, MECH 403N2/D2, MECH 404, 9 credits).

There is nevertheless Honours design project (MECH 494, 3 credits) but it differs in a number of aspects from the capstone design project of the Regular program: (1) it is only one term long; (2) it is an individual project, not a team one; (3) it is a computer-based project, meaning that students complete the entire design cycle and produce drawings and a report but are not requested to actually built/manufacture the designed product.

Several courses in the Regular program are replaced, for the purpose of the Honours program, by courses with more analytical contents. In particular, students in the Honours program would normally NOT take: MIME 260, MECH393, MECH 412, and ESCE 461. Two Regular program courses, MECH 314 and MECH 315, are replaced with one course MECH 419 in the Honours program.

Instead of the above courses, Honours students take a Math Elective out of the list of 7 courses

and two Advanced Technical Complementaries out of the list of 6 courses. These lists can be seen in the table below.

Courses	**Credits**	**Regular Program**	**Honours Program**	**Comments (from the point of view of Honours Program)**
MIME 260 Materials Science and Engineering	3	●	×	Can be counted as the third TC, if was taken prior to transfer to Honours Program
ECSE 461 Electric Machinery	3	●	×	Can be taken as the third TC
MECH 314 Dynamics of Mechanisms	3	●	×	Cannot be taken as TC (overlap with MECH 419)
MECH 315 Mechanics 3	4	●	×	Cannot be taken as TC (overlap with MECH 419)
MECH 393 Machine Element Design	3	●	×	Can be taken as the second or third TC
MECH 412 System Dynamics and Control	3	●	×	Can be taken as the second or third TC
MECH 419 Advanced Mechanics of Systems	4	×	●	
MECH 463 D1, MECH 463 D2 Mechanical Engineering Project	6	●	×	
MECH 403N1/D1, MECH 403N2/D2 **MECH 404** Honours Thesis	9	×	●	
MECH 494 Honours Design Project	3	×	●	
Math Elective	3	×	●	One of the following courses: **MATH 316** Complex Variables (to be approved) **MATH 323** Probability **MATH 326** Nonlinear Dynamics and Chaos **MATH 327** Matrix Numerical Analysis **MATH 417** Linear Optimization **MATH 478** Computational Methods in Applied Mathematics
Advanced Technical Complementary 1	3	×	●	Two of the following courses: **MECH 513** Control Systems **MECH 546** Finite Element Methods in Solid Mechanics **MECH 562** Advanced Fluid Mechanics **MECH 559** Engineering Systems Optimization **or MECH 579** Multidisciplinary Design Optimization **MECH 578** Advanced Thermodynamics
Advanced Technical Complementary 2	3	×	●	

When choosing the Math Elective and Advanced Technical Complementaries, it is strongly recommended to discuss your choice with your research supervisor, if you already have one.

Similar to Regular program students, Honours students still take 3 Technical Complementaries which follow the same rules as in the Regular program. There is no difference between the programs in this regard.

In the Regular program, MIME 260 is listed early in some course sequences. Therefore, if a student has taken MIME 260 prior to transfer to the Honours program, it is allowed to count it as the third Technical Complementary. However, MIME 260 should not be taken after transfer to the Honours program.

If an Honours student wishes to take MECH 393, or MECH 412, or ECSE 461 as electives, this is allowed, and these courses can then be counted as the second or third Technical Complementaries. However, please note that if the courses are full the priority will be given to students from the Regular program since for them those courses are core courses.

However, MECH 314 and MECH 315 canNOT be counted as the second or third Technical Complementaries due to significant overlap with MECH 419 and, therefore, should not be taken by Honours students or students planning to transfer. At the same time, MECH 314 and MECH 315 can be counted as Elective Courses (EC1 and EC2) for CEGEP-entry students entered in Fall 2019 or earlier (from Fall 2020 entry, EC1 and EC2 are no longer required).

3. Requirements and Timing for Transfer

Students interested in transferring into the Honours program should have a minimum CGPA of 3.5 and should contact Honours Program Coordinator to discuss the possibility of transfer. The Coordinator also pays close attention to CGPA in mechanical (MECH) courses.

While in the Honours program, students are expected to maintain CGPA of 3.5 or higher. If after the transfer CGPA goes consistently below 3.5 and/or too many C, D, and F grades appear in the transcript the student may be requested to return to the Regular program.

The right time to transfer into the Honours program is after the Fall semester of U2 or after the Winter semester of U2 (when the grades for those terms are out).

Once you have the approval of Honours Program Coordinator, the transfer itself is a simple procedure involving the following form:
https://www.mcgill.ca/engineering/files/engineering/course_authorization_form_2020_12_0.pdf
It can be completed within a few days.

Students having aspiration to transfer to the Honours program should be careful and not to take any courses which are not in the Stream C (Honours) curriculum. Special attention should be paid to MECH 314 and MECH 315 since they are relatively early in the Regular program, and it is not permitted to count them as Technical Complementaries in the Honours program.

It does not matter at all when the student transfers into the Honours program. Therefore, in case of doubts, the decision can be postponed as long as students are still able to follow Stream C curriculum without transfer to the Honours program (this is easily doable till the end of U2).

To familiarize themselves better with the Honours program, students are invited to attend Honours presentations which are held at the end of each term (the announcement is sent to all undergraduate students a few weeks in advance). The samples of Honours theses can be seen at the office of Honour Program Coordinator (MC121).

4. How to Find a Supervisor

A supervisor is required for both Honours research project and Honours design project.

The first step is to decide the research area of interest (fluid mechanics, robotics, manufacturing, materials, etc.). For this purpose, students are advised to consult the departmental and personal websites of professors.

The next step is to contact (e.g., by e-mail) one or a few professors in the chosen area and ask them whether they have open Honours projects for certain terms, and if they do, to discuss the projects. For success, it is important to find a project which students are genuinely interested in.

To assist students in finding a project/supervisor, a dedicated webpage is created. Some available projects may be seen there:
https://www.mcgill.ca/mecheng/undergrad/honours-projects/thesis-projects
https://www.mcgill.ca/mecheng/undergrad/honours-projects/design-projects
However, it is not an exhaustive list. Some professors do not use this avenue for advertising their projects (especially design projects), even though they may have them.

Note that professors may request to see student's transcript before agreeing to be the supervisor.

If it is desired to start Honours project in a Fall term, it is strongly recommended to secure the supervisor no later than during the previous Winter term, since in the summer professors may be on travel or otherwise less available. If it is desired to begin Honours project in a Winter term, it is recommended to start looking for a project no later than from the beginning of the previous Fall term. It is not acceptable to start looking for a supervisor at the beginning of the first term of thesis research.

5. Honours Thesis Research Project and Related Courses

Honours students must undertake a research project under supervision of a professor in the Department. Co-supervision (two or more supervisors) is also allowed if the research topic

warrants it. It is also possible to have a supervisor from another department at McGill. A supervisor from another university would require a co-supervisor from McGill.

The thesis project is an individual project, not a team one. However, it is possible that, in some cases, students may become a part of the research team of their supervisor and collaborate with other Honours students, Master students, and PhD students during their research projects.

The Honours research project is represented in the curriculum by three courses: MECH 403D1 or MECH 403N1 (3 credits), MECH 403D2 or MECH 403N2 (3 credits), and MECH 404 (3 credits), 9 credits in total. All these courses <u>together</u> represent the thesis project, which is carried out in the lab, at home, in the library etc. There are no regular classes for these courses apart from a few one-hour tutorials.

The Honours research project must be carried out in two <u>consecutive</u> terms: Fall and Winter or Winter and Fall. In other words, Honours students may begin their research project either in Fall or in Winter term. It is not possible/allowed to have a gap between the first and second terms of thesis research.

In the first term of their research project, students <u>must</u> be registered for MECH 403D1 (Fall term) or MECH 403N1 (Winter term). In the second term of their research project, students <u>must</u> be registered for MECH 403D2 (Winter term) or MECH 403N2 (Fall term) and Mech 404. The grades for <u>all</u> these courses are released simultaneously at the end of the second term.

In most cases, students either do their research project in Year U4 (Fall and Winter) or begin it in the Winter term of U3 and continue in the Fall term of U4. In principle, students may begin their Honours Thesis even earlier, however, there are two constraints. Firstly, there is a prerequisite of having a minimum of 60 program credits (not counting U0). Secondly, for obvious reasons it is not recommended that a student begins the thesis research before completion of core courses related to the chosen thesis topic.

6. Honours Design Project (MECH 494)

Similarly to Honours thesis projects, students must secure an Honours design project in advance by contacting professors. Some guidance in this regard can be also obtained from the current MECH 494 instructor. It is not acceptable to start looking for a design project at the beginning of the term in which MECH 494 is taken since it may take 2-3 weeks – a considerable portion of the term.

It is allowed to have the same supervisor for the thesis and design projects. However, there should be no overlap of their contents.

MECH 494 can be taken in parallel with MECH 403-404 or in another term. These courses are completely independent.

MECH 494, similarly to MECH 403-404, does not have regular class hours.

7. Minors, Concentrations, Exchange Year

As in the Regular program, students in the Honours program can enhance their degree by adding a minor, a concentration, an exchange program, or an internship. There is no difference between the programs in this regard.

When considering an exchange program or an internship and its timing, Honours students should keep in mind that they must be present at McGill for two consecutive terms to do their Honours thesis (not counting Summer term).

Students taking a minor or a concentration must satisfy all respective requirements but may use some of the courses to meet their Technical Complementary and/or Advanced Technical Complementary requirements (this is true in both the Honours and Regular programs).

8. Frequently Asked Questions

Should Winter+Fall Honours students work on their thesis during the summer term? Can the supervisor request to do so?

No. This is neither expected nor required. However, it is possible in case of mutual desire and agreement of the student and the supervisor. Such summer work cannot be considered as a substitute of the work during Winter or Fall terms, only as a supplement.

Is it possible to combine the Honours research project with a SURE project?

In principle, yes, but this arrangement is solely on the discretion of the supervisor (and they are not under obligation to provide such an opportunity). It is not allowed to work on a SURE project as a substitution for one of the terms of the Honours thesis research. SURE project can be only used to produce better thesis resulting, perhaps, in a conference or journal publication.

What is the difference or relation between the Honours program and graduation with honours?

These are not related at all. Graduation with or without honours depends on student's CGPA, not on which program the student is in. It is possible to graduate from the Honours program without honours, and it is possible to graduate from the Regular program with honours.

Is it absolutely necessary to go through Honours Program to continue for graduate studies?

No, it is not. Many students from the Regular program proceed to graduate studies as well. However, the Honours program allows to acquire some research experience (another avenue to achieve that within both programs is the SURE program which is available to all students but on a competitive basis) and would give students better idea whether they indeed like research activities and wish to continue to Master (Thesis) program. Furthermore, it may be beneficial

when applying for graduate studies, especially to universities with competitive scholarships, to demonstrate some research experience, thesis, and, if applicable, resulting publications.