

Certificate in Genetics Checklist

Certificate Coordinators

Biochemistry & Molecular Biology - Dr. Claudio Slamovits (claudio.slamovits@dal.ca) 494-8825, Tupper Rm 8-B2

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Psychology & Neuroscience – Dr. Ian Weaver (ian.weaver@dal.ca) 494-1133, LSC Rm 3340

Certificate requirements:

1. A minimum grade of **B-** is required in **three** mandatory courses:

- BIOL 2030.03: Genetics and Molecular Biology
- BIOC 2300.03: Introduction to Biochemistry
- BIOC 3400.03: Nucleic Acid Biochemistry and Molecular Biology

2. Other required courses

- CHEM 2401.03 Introductory Organic Chemistry: Structure, Concepts of Mechanisms and Spectroscopy
- CHEM 2402.03 Introductory Organic Chemistry: Reactivity of Functional Groups

3. A minimum grade of **B-** in **12 credit hours** chosen from the following list.

At least 6 credit hours must be at the 4000 level.

2000 level

- BIOL 2040.03: Evolution

3000 level

- BIOL 3037.03: Life Rewritten: Applications and Implications of Gene Editing and Synthetic Biology
- BIOL/MARI 3042.03: Molecular Ecology
- BIOL 3044.03: Ecological Genetics
- BIOL 3046.03: Molecular Evolution
- MICI 3114.03: Virology
- NESC/PSYO 3670.03: Genes, Brain and Behaviour

4000 level

- BIOC 4010.03: Bioinformatics
- BIOC/MICI 4027.03: Molecular Mechanisms of Cancer
- MICI 4033.03: Advanced Microbial Genetics
- MICI 4114.03: Advanced Topics in Molecular and Medical Virology
- BIOC 4403.03: Genes and Genomes
- BIOC 4404.03: Gene Expression
- BIOC 4501.03: Medical Biotechnology
- BIOC 4835.03/BIOL 4035.03: Human Genetics
- NESC 4670.03: Behavioral Neuro(epi)genetics and Genomics

4. A minimum grade of **B-** in **3 credit hours (or more)** of independent research on a topic involving microbial genetics, molecular genetics, genomics, transmission genetics or population genetics (See topics that qualify and criteria below after Checklist). **Note:** *Co-op Work Terms are not applicable.* Eligible research courses are listed below.

- BIOC 4001.03 Special Topics in Biochemistry
- BIOC 4604.03 and BIOC 4605.03 Research Project I and II
- BIOL/MARI 4806.03 or 4807.03 Independent Research I (or II) in Biology or Marine Biology
- BIOL/MARI 4901.03 and 4902.03 Honours Research and Thesis I and II
- MICI 4701.03 or 4702.03 Advanced Topics in Microbiology and Immunology
- MICI 4703.03 and 4704.03 Directed Research Project I and II
- MICI 4901.03 and 4902.03 Honours Research and Thesis
- NESC/PSYO 3100/3101 Independent Research
- NESC/PSYO 4501.03 and 4502.03 Honours Thesis (formerly 4500X/Y.06)
- SCIE 4101.03 and 4102.03 Directed Project in Medical Sciences (formerly SCIE 4100X/Y.06)
- SCIE 4901.03 and 4902.03 Honours Research and Thesis (formerly SCIE 4900X/Y.06)

Admission to the Certificate in Genetics

5. Students should enrol in the Certificate in Genetics in their third year of studies, after they have sought approval of the independent research component from the Certificate Coordinator for their degree program. The research topic must be pre-approved by the Certificate Coordinator for your Degree Program prior to the start of the research course by submitting the research proposal to the Certificate Coordinator. To do this, use the PDF that can be reached through the link on the Faculty of Science Certificates and Diplomas Web page. If there is a change in research topics or approaches as the research is conducted these changes must be approved by the Coordinator to ensure eligibility for the Certificate. **Contact your Coordinator by email to update them!**

6. To enrol in the *Certificate in Genetics*, students must declare the certificate through Dal Online (<https://dalonline.dal.ca> >Web for Students>Admissions>Declare Major/Minor/Certificate) and notify the Certificate Coordinator.

Completion of the Certificate in Genetics

7. To graduate with the Certificate, students must apply to graduate with the certificate at the time they apply to graduate from their degree program. (Note: students may receive an email from the Registrar's Office in December informing them that not all components of the Certificate have been completed. This is because the research component is incomplete: provided you have received preliminary approval of your research, you do not need to contact the Coordinator). Check the Certificate page of DARS to ensure all your course work is in place.

8. Confirmation of completion of all course and research components by one of the Certificate in Genetics Coordinators is required. At the end of the term in which the research is completed the student must send a copy of their Honours thesis or course written report to the Certificate Coordinator for confirmation of completion of the independent research component. The Coordinator will report completion of this final component to the Registrar's Office. The Certificate will be awarded to students upon graduation from their undergraduate degree program. Completion will be indicated on a student's transcript.

Criteria for the Genetics Research Component of the Certificate in Genetics:

To qualify as primarily genetics-based (as opposed to being cell biology or molecular biology) the research must involve **two or more** of the following:

1. Use of approaches that are genetic in nature, for example, altering gene expression through creating mutant alleles or using silencing microRNAs to alter gene expression and then monitoring the resultant phenotype through assessing expression of particular genes/phenotypic assays.
2. Critical analysis demonstrating understanding of genetic concepts and synthesis of material from different sources.
3. Investigation of gene function by manipulating/editing or cloning genes (not just monitoring gene expression)
4. Analysis of inheritance of traits /transmission genetics
5. Population genetics studies
6. Genomics/ genome-wide gene expression profiling
7. DNA sequence analysis
8. Analysis of genetic interactions or protein-DNA interactions
9. Gene discovery
10. DNA chromatin structure and modification studies

Note: Entirely paper-based research done as a Special Topics class could qualify as long as it is primarily genetics based and highly supervised (regular meetings with the supervisor to assess quality and provide feedback throughout the project) and it meets the criteria for genetics research. The research must be in-depth, not just reading and reporting the work of others.

Note: Use of qPCR or protein expression to detect gene expression is not sufficient to qualify the research as genetics in the absence of one or more of the other criteria.