HONOURS BSC IN MATHEMATICS/HONOURS BSC IN COMPUTER SCIENCE (DATA SCIENCE)

Mathematics
Mathematics and statistics are not only powerful problem-solving tools, but also highly creative fields of studies that combine imagination with logic, and precision with intuition.

Mathematics is much more than numbers! Its basic goal is to reveal and model general patterns to help explain our world, whether they be found in electrical impulses in the human nervous system, the evolution of animal populations in their habitats, fluctuations in stock-market prices, or electronic communications. Mathematics reaches far beyond science and engineering into medicine, business and the social sciences.

Advances in mathematics and statistics lie behind many discoveries that are now part of our daily lives, such as MRI scanners, digital compression of music and video, secure electronic communications, data mining, genomic algorithms, futures pricing, and many other innovations.

The Department of Mathematics and Statistics offers Honours, majors and minors both in mathematics and in statistics. Our Honours program in statistics is accredited by the Statistical Society of Canada, allowing graduates to earn the A.Stat. professional designation. Moreover, the Department offers a joint honours program in mathematics and economics, a joint honours program in mathematics and computer science, as well as a multidisciplinary program in financial mathematics and economics. All our honours programs also include the co-operative education option.

This program is offered in English and in French.

Computer Science
Computer science at the School of Electrical Engineering and Computer Science combines the study of computation and information processing fundamentals with their application in the world around us. Computer scientists build fast, reliable, scalable and secure software systems to organize and analyze information. The honours curriculum comprises advanced topics in databases, artificial intelligence, computer graphics, security, distributed computing and algorithm design, culminating in an honours project.

This program teaches graduates how to use their creative and innovative talents to conceive, design and implement software systems. The French Immersion Stream is now available to all students in the Computer Science program. Our degrees are very flexible and include options, minors and a major, which can be used to explore connections between computer science and many other fields of study.

Program Requirements
Co-operative education is available with this program.

The French immersion stream is available with this program.

Requirements for this program have been modified. Please consult the 2020-2021 calendars (https://catalogue.uottawa.ca/en/archives/) for the previous requirements.

Compulsory courses at the 1000 level:
- ENG 1112: Technical Report Writing 3 Units
- ITI 1100: Digital Systems I 3 Units
- ITI 1120: Introduction to Computing I 3 Units
- ITI 1121: Introduction to Computing II 3 Units
- MAT 1320: Calculus I 3 Units
- MAT 1322: Calculus II 3 Units
- MAT 1341: Introduction to Linear Algebra 3 Units
- MAT 1348: Discrete Mathematics for Computing 3 Units

Compulsory courses at the 2000 level:
- CEG 2136: Computer Architecture I 3 Units
- CSI 2101: Discrete Structures 3 Units
- CSI 2110: Data Structures and Algorithms 3 Units
- CSI 2120: Programming Paradigms 3 Units
- CSI 2132: Databases I 3 Units
- CSI 2911: Professional Practice in Computing 3 Units
- MAT 2122: Multivariable Calculus 3 Units
- MAT 2125: Elementary Real Analysis 3 Units
- MAT 2143: Introduction to Group Theory 3 Units
- MAT 2371: Introduction to Probability 3 Units
- MAT 2375: Introduction to Statistics 3 Units
- SEG 2105: Introduction to Software Engineering 3 Units

Compulsory courses at the 3000 level:
- CSI 3104: Introduction to Formal Languages 3 Units
- CSI 3105: Design and Analysis of Algorithms I 3 Units
- CSI 3120: Programming Language Concepts 3 Units
- CSI 3131: Operating Systems 3 Units
- MAT 3341: Applied Linear Algebra 3 Units
- MAT 3373: Methods of Machine Learning 3 Units
- MAT 3375: Regression Analysis 3 Units
- SDS 3386: Data Science Lab 3 Units

Compulsory courses at the 4000 level:
- CSI 4106: Introduction to Artificial Intelligence 3 Units
- CSI 4142: Fundamentals of Data Science 3 Units
- MAT 4374: Modern Computational Statistics 3 Units
- MAT 4376: Topics in Statistics 3 Units

Optional Courses
- 3 optional course units from:
  - MAT 2141: Honours Linear Algebra 3 Units
  - MAT 2342: Introduction to Applied Linear Algebra 3 Units

- 3 optional course units from:
  - CSI 4145: Machine Learning 3 Units
  - MAT 4373: Statistical Machine Learning 3 Units

- 3 optional course units from:
  - CSI 4900: Honours Project 3 Units
  - MAT 4900: Undergraduate Research Project 3 Units

- 9 optional course units from:
  - MAT 3377: Sampling and Surveys 9 Units
  - MAT 3378: Analysis of Experimental Designs 9 Units

This is a copy of the 2021-2022 catalog.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>MAT 3379</td>
<td>Introduction to Time Series Analysis</td>
<td></td>
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<tr>
<td>MAT 4175</td>
<td>Introduction to Mathematical Statistics</td>
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<td>MAT 4375</td>
<td>Multivariate Statistical Methods</td>
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<td>MAT 4387</td>
<td>Optimization: Theory and Practice</td>
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<tr>
<td>CEG 3185</td>
<td>Introduction to Data Communications and Networking</td>
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<tr>
<td>CSI 3130</td>
<td>Databases II</td>
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<tr>
<td>CSI 3140</td>
<td>WWW Structures, Techniques and Standards</td>
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<td>CSI 4107</td>
<td>Information Retrieval and the Internet</td>
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<tr>
<td>CSI 4139</td>
<td>Design of Secure Computer Systems</td>
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<tr>
<td>CSI 4130</td>
<td>Computer Graphics</td>
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<td></td>
<td>6 optional course units in mathematics (MAT) or</td>
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<td></td>
<td>computer science (CSI) at the 3000 or 4000 level</td>
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<td></td>
<td>6 optional course units in computer science (CSI) at the 2000 or 3000 or 4000 level</td>
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<td>6 optional course units in mathematics (MAT) at the 2000 or 3000 or 4000 level</td>
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<td>9 elective course units offered by the University of Ottawa excluding courses offered by the Faculty of Science and the Faculty of Engineering</td>
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Total: 150 Units