***Items related to expected use of technology (handheld as well as computer software) appear in bold italics.***

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Matrices | 1. Applications of Matrix Algebra<br>a) using vector and matrices to represent information<br>b) relating addition of matrices and multiplication by a scalar to applications<br>• inventory<br>• production<br>c) relating multiplication of matrices to applications<br>• production costs<br>• coding<br>• transportation networks<br>• simple Markov processes | Very similar expectations.<br><br>Include applications of row and column sums.<br><br>Greater emphasis on application to problems.<br><br>***Expectation that students will demonstrate proficiency with and without aid of technology***.<br><br>**NO MARKOV PROCESSES.**<br><br>Application to the work on graph theory in the Organization of Data for Analysis strand. |
| | 2. Solving Systems of Equations and Inequalities<br>a) linear functions, piecewise linear functions and step functions to model situations<br>b) solving problems with up to 4 linear equations by elimination<br>c) augmented matrices<br>d) row-reduced echelon form<br>e) using technology to solve systems<br>f) using constraints to generate inequalities<br>g) graphical solution of systems of inequalities<br>h) geometric linear programming<br>i) solving problems using linear programming and simplex (optional) | NOT IN THE COURSE.<br>(Some of this content now part of the new Geometry and Discrete Mathematics course, MGA4U) |

THOMSON NELSON

1120 Birchmount Road, Toronto, ON M1K 5G4
(416) 752-9448 or 1-800-268-2222 • Fax (416) 752-8101 or 1-800-430-4445
Email: inquire@nelson.com • Internet: www.nelson.com

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Combinatorics | 1. Permutations<br>a) r-arrangements of n different things<br>b) factorial<br>c) arrangements when some are alike | Less emphasis on solution of algebraic equations and simplification of complicated expressions.<br>The more difficult types of permutation counting problems are part of the new Geometry and Discrete Mathematics course, MGA4U |
| | 2. Combinations<br>a) r-subsets of a set of n objects<br>b) number of subsets<br>c) C(n, r), $\binom{n}{r}$ notation and formula<br>d) indirect reasoning | Less emphasis on solution of algebraic equations and simplification of complicated expressions.<br>The more difficult types of combination counting problems are part of the new Geometry and Discrete Mathematics course, MGA4U<br><br>Use Venn diagrams as a tool for organizing information in counting problems. |
| | 3. The Binomial Theorem<br>a) Relating Pascal's triangle to the expansion of a binomial.<br>$\binom{n}{r}+\binom{n}{r+1}=\binom{n+1}{r+1}$<br>b) Proving the Binomial Theorem using number of r-subsets.<br>c) Mathematical Induction (optional)<br>d) Using the general term in the expansion to determine coefficients of a given power. | Identify patterns in Pascal's triangle and relate the terms of Pascal's triangle to values of $\binom{n}{r}$ to the expansion of a binomial $(a + b)^n$, and to the solution of related problems.<br><br>**NO EXPECTATION REGARDING PROOF OF THE BINOMIAL THEOREM.** |
| | 4. Finite Series<br>a) – c) Proving and using formulas for arithmetic, geometric and infinite geometric series and sum of binomial coefficients<br>d) telescoping sums (optional)<br>e) other sums (optional) | NOT IN THE COURSE. |

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Probability and Applications | 1. Probability<br>a) Relating concepts of probability to applications.<br>b) Investigating situations that may be represented by uniform probability models.<br>c) Probability of an event.<br>• ratio of favourable outcomes to total equally likely outcomes<br>• use counting methods to determine probabilities<br>d) Investigate rules for probability calculations and their uses.<br>• P(A or B) (mutually exclusive and otherwise)<br>• P(A and B) (independent and otherwise)<br>• P(A \| B) and P(A′)<br>e) Tree diagrams. | General flavour is pretty much the same.<br><br>**SPECIFIC EXPECTATIONS RELATED TO SIMULATIONS:**<br>• Identify the advantages of using simulations in contexts.<br>• ***Design and carry out simulations*** to estimate probabilities in situations for which the calculation of the theoretical probabilities is difficult or impossible.<br>• Assess the validity of some simulation results by comparing them with the theoretical probabilities, using the probability concepts developed in the course.<br><br>**This implies the use of technology as well as hands-on simulations.** |
| | 2. Applications of Probability<br>a) Random Variables.<br>b - c) Recognizing and calculating probabilities for situations using uniform distributions<br>d – e) Recognizing and calculating probabilities for situations using binomial distributions<br>f – g) Recognizing and calculating probabilities for situations using hypergeometric distributions | • identify examples of discrete random variables<br>• construct a discrete probability distribution function by calculating the probabilities of a discrete random variable;<br>• calculate expected values and interpret them within applications as averages over a large number of trials;<br>• determine probabilities, using the binomial distribution |

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Statistics | CONSIDERED A SUB-HEAD UNDER PROBABILITY.<br><br>3. Statistics<br>a) Frequency diagrams<br>• frequency (histograms)<br>• relative frequency<br>• cumulative frequency<br>b) Summary statistics (1-variable)<br>• percentile<br>• range<br>• deviation<br>• mean deviation<br>• standard deviation<br>c) Investigating situations modelled by a normal distribution<br>• percentages within 1or 2 s.d. of the mean<br>d) Using normal distribution to approximate the binomial distribution | **MUCH MORE EMPHASIS ON THE USE OF TECHNOLOGY TO DETERMINE STATISTICS.**<br><br>MORE EMPHASIS ON INTERPRETING STATISTICS TO DESCRIBE CHARACTERISTICS OF A DATA SET<br><br>Collecting Data<br>• understand purpose and use of various sampling techniques<br>• simple random<br>• systematic<br>• stratified random<br>• bias and variability<br>• describe types of bias in surveys<br>• illustrate sampling bias and variability by repeated sampling of a known population<br>• organize and summarize data from secondary sources using technology<br><br>One Variable Statistics<br>• understand use of, interpret and ***compute using technology***<br>• mean, median, mode<br>• range, interquartile range<br>• variation, standard deviation<br>• z-scores, percentiles |

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Statistics | | Normal Distribution<br>• Identify common distributions.<br>  • bimodal, U-shaped, exponential<br>  • skewed, normal<br>• Use properties of the Normal Distribution to solve problems.<br>  • location of mean, median and mode<br>  • symmetry about mean<br>  • 1 and 2 standard deviation spreads<br>  • make probability statements about normal distributions in applications<br><br>Two Variable Statistics<br>• linear regression and correlation coefficient<br>  • measure of fit of a linear model to a scatter graph<br>  • ***calculate using technology***<br>• understand the distinction between mathematical correlation and cause-and-effect<br>  • describe possible misuses<br><br>Evaluating Validity<br>• explain examples of use/misuse of statistics in the media<br>• assess validity of conclusions by analyzing sources of bias or ***recomputing statistics***<br>• explain use of indices |

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Organization of Data for Analysis | NOT IN THE COURSE. | **MAJOR EMPHASIS ON LOCATING AND ORGANZING DATA FOR ANALYSIS USING TECHNOLOGY (see project strand).**<br><br>Organizing Data<br>• locate data<br>  • ***search databases***<br>  • ***use Internet*** as a source for databases<br>  • ***create databases using spreadsheet or database software***<br><br>Using Diagrams to Solve Problems<br>• represent processes<br>  • simple iterative processes<br>  • branches and loops (flow diagrams)<br>• represent complex tasks, issues<br>  • tree diagrams<br>  • network diagrams<br>  • cause-and-effect diagrams<br>  • time lines<br>• solve network problems using introductory graph theory (see matrices)<br><br>**SUGGEST THIS IS BACKGROUND FOR THE FINAL PROJECT.** |

| Content Area | OAC Finite Mathematics | Grade 12 Mathematics of Data Management |
|---|---|---|
| Integration of the Techniques of Data Management | NOT IN THE COURSE | By the end of this course, students will:<br>• carry out a culminating project on a ***topic or issue of significance that requires the integration and application of the expectations of the course***;<br>• ***present a project*** to an audience and critique the projects of others.<br><br>Carrying Out a Culminating Project<br>• pose a ***significant problem*** whose solution would require the organization and analysis of a ***large amount of data***;<br>• ***select and apply the tools of the course*** (e.g., methods for organizing data, methods for calculating and interpreting measures of probability and statistics, methods for data collection) to design and carry out a study of the problem;<br>• compile a clear, well-organized, and fully justified ***report of the investigation and its findings***.<br><br>Presenting and Critiquing Projects<br>• create a summary of a project to present within a restricted length of time, ***using communications technology*** effectively;<br>• answer questions about a project, fully justifying mathematical reasoning;<br>• critique the mathematical work of others in a constructive fashion.<br>**THE PROJECT SHOULD MAKE UP A SIGNIFICANT COMPONENT OF A STUDENT'S FINAL GRADE IN THE COURSE.**<br>**THE PROJECT WILL REPRESENT A SUBSTANTIAL INVESTMENT OF TIME AND EFFORT AND WILL REQUIRE TECHNOLOGY.**<br>**THE PROJECT PROCESS WILL HAVE TO BE MONITORED CAREFULLY** |