COURSE FRAMEWORK TEMPLATE GUIDE

GENERAL INFORMATION

COURSE TITLE				COURSE NUMBER
Linear Algebra for Social Science				201-208-VA
PROGRAM CODE AND TITLE				PROGRAM COMPONENT
300.AB Commerce, 300.A3 (Commerce, 3 math courses; Social Science with Math, 2 math courses)				Program-specific (Pre-U)
PREREQUISITES	SEMESTER	PONDERATION	TOTAL CONTACT HRS	TOTAL HOMEWORK HRS
Secondary V mathematics. Technical or science option, CEGEP course 201-015-RE	3	2-2-2	60	40
COURSE'S ROLE IN THE PROGRAM				
The linear algebra course is generally taken by students as they approach graduation from the Commerce or Social Science with Math program in the second year of studies. Upon successful completion of the course students will be able to model and solve multivariable linear systems using gaussian elimination or inverses and will study some applications of linear algebra including Leontief economic models, linear programming, and Markov chains. Students will also study the geometry of lines and planes. *Briefly describe the course and situate it within the context of the program by explaining its relationship with other courses.*				

COURSE-LEVEL LEARNING OUTCOME

Apply the methods of linear algebra to problem solving in context of Social Science, including Commerce and Economics

Learning outcomes are observable, measurable actions that demonstrate students' learning (i.e., the attainment of the competencies and transversal learning). Learning outcomes should be descriptive statements expressed with action verbs. They must reflect the level of learning expected of students taking the course—a level which is determined by the course competency(ies). Consulting a taxonomy (such as Bloom's) is useful for developing appropriately leveled learning outcome statements.

The course-level learning outcome is a concise expression of the learning students will develop in the course. It aligns with the statement(s) of the course competency(ies). It is a descriptive statement expressed with (an) action verb(s) and is typically a sentence or two in length.

KEY LEARNING OUTCOMES

1: Accurate recognition of the context in which methods of linear algebra can be applied.

2: Use appropriate mathematical modeling of real-world situations using linear algebra tools.

3: Perform operations on matrices and vectors in conformity with rules of linear algebra.

4: How to apply matrices in context of open/closed economy models and linear logistics problems.

5: Provide a correct interpretation of the results.

6: Provide a justification of their steps in problem-solving procedures in context of Social Science.

Identify approximately 3 to 6 key learning outcomes that demonstrate student learning in this course. They should lead to the course-level learning outcome. (Note: each key learning outcome should be addressed by an assessment.)

LEARNING INTEGRATION ASSESSMENT (LIA)

The LIA for this course consists of a cumulative final exam worth 40% of the term mark. If it is to the benefit of the student, the LIA will be reweighted to 80% of the course grade. The topics covered on the exam are chosen in accordance with departmental policies which ensure that (all of) the competencies of the course are evaluated. If the final exam is held online, then only the grading scheme in which the final exam is worth 40 % will be used.

EVALUATION CRITERIA FOR THE LEARNING INTEGRATION ASSESSMENT
1. Appropriate use of concepts. 2. Correct use of appropriate matrix operations. 3. Accurate recognition of the characteristics of vectors, lines, and planes. 4. Correct application of Leontief's method to economy models 5. Correct application of the simplex method. 6. Appropriate use of Markov chains to represent a current human reality, and representation of a transition diagram. 7. Correct interpretations of results. 8. Explanation of steps in problem-solving procedure. 9. Use of appropriate terminology.

List the key criteria by which students will be assessed for this activity. Take into consideration the key learning outcomes for the course. This section is not a marking rubric.

Indicate in the box, the percentage of the final grade that the LIA will be worth.

WEIGHT OF GRADE (%)
40 OR 80

COMPETENCIES AND TRANSVERSAL LEARNING				
CODE	COMPETENCY STATEMENT	PROGRESSION	HOURS	OTHER COURSES CARRYING THE COMPETENCY
0PU4	Analyze problems studied in the social sciences by using linear algebra and vector geometry.	Comprehensive	60	none
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		Choose an item.		
TRANSVERSAL LEARNING				

The course will reinforce a systematic approach to problem-solving. Students will be asked to reason logically. They will become familiar with the context in which scientific concepts are discovered and developed.

Provide a justification of their steps in problem-solving procedures in context of Social Science. Use of algebraic operations in conformity with rules. Students will know how to translate word problems into mathematical language with the help of matrices, vectors and systems of linear equations.

Transversal learning is not explicitly mentioned in the course competency(ies) but is needed across different disciplines in the program (e.g. professional attitudes and essential skills such as communication, research, and ICT skills). It may be mapped to multiple courses. (See, for example the Aims of College Education and the Common Competencies of College Education.)

STUDENT PROFICIENCY IN THE LANGUAGE OF INSTRUCTION (SPLI)

Student proficiency in the language of instruction is the ability to write, read, speak, and listen in order to communicate effectively at the college level. SPLI may also require discipline-specific vocabulary, documentation, and communication skills; assessment of language skills must account for a minimum of 10% of any take-home written assignment or oral presentation in which English is the language of expression.

There are no mandatory written assignments in this course, but mathematical calculations.

PEDAGOGICAL STRATEGIES AND ASSESSMENTS

Describe how students will develop their learning and how that learning will be assessed in the course.

. Quizzes, Tests, Assignments are used in this course.

- *Key formative, summative, or integrative assessments (Note: each key learning outcome should be addressed by an assessment.)*
- *Key learning activities*
- *Pedagogical strategies that support learning in this course*

You may also make recommendations to support your colleagues in teaching the course. For example, you may choose to include concise descriptions of the following:

- *Suggestions for real-world contexts for activities or assessments that help support learning: Optimization and logistics problems, open and closed economies.*
- *Suggestions for sequencing of main steps or stages of learning: The student acquires mathematical concepts and connects these concepts to real life through applications*
- *Suggestions for course materials agreed on by the department: as approved by the department.*

APPENDIX 1 – EXCERPT OF THE MINISTERIAL *DEVIS*

UNIVERSITY PREREQUISITE CODE: 0PU4

Objective	Standard
Statement of the Competency Analyze problems studied in the social sciences by using linear algebra and vector geometry	Performance Criteria for the competency as a whole • Accurate recognition of the context in which linear algebra and vector geometry emerged • Appropriate mathematical modelling of real-world situations studied in the social sciences • Correct use of mathematical syntax • Demonstration of rigorous mathematical reasoning • Accurate and coherent interpretation of results
Elements of the Competency	Performance Criteria
1. Apply mathematical models to current human realities	• Accurate recognition of the characteristics of the matrices pertaining to current human realities • Correct use of appropriate matrix operations • Appropriate use of matrices to represent a current human reality
2. Solve an economic production problem	• Appropriate use of a system of linear equations to represent a current human reality • Correct use of "2 x 2" AND "3 x 3" determinants • Relevant application of the methods for solving systems of linear equations [1] • Correct application of Leontief's method to open economy and closed economy models
3. Model situations that are specific to current human realities and that involve two or more variables	• Accurate recognition of the characteristics of vectors, lines, and planes [2] • Appropriate application of vector operations and products • Establishment of relevant relationships between the geometric loci and constraints specific to a current human reality
4. Solve optimization problems specific to current human realities	• Appropriate use of a system of linear inequalities to represent a current human reality • Correct solution of systems of linear inequalities • Complete solution of a linear programming problem specific to a current human reality • Correct application of the simplex method

5. Solve problems specific to current human realities by using Markov processes	• Appropriate use of Markov chains to represent a current human reality • Appropriate representation of a transition diagram • Accurate interpretation of how a current human reality manifests itself over the long term

Learning Activities

Discipline: Mathematics (201)
Periods of instruction: 60

Additional information:

- Students must have successfully completed the Technical and Scientific Option or the Science Option in Secondary V mathematics
- Social Science problems refer in particular to the fields of economics and administration.
- If necessary, technological tools can be used.

The compulsory content is as follows:

- [1] Methods for solving systems of linear equations
  - Gaussian elimination method
  - Inverse matrix method
- [2] Characteristics of vectors, lines, and planes
  - Geometric and algebraic vectors
  - Line in the plane
  - Line and plane in space

APPENDIX 2 – COURSE DESCRIPTION

The course description is an optional part of the course framework. It should be written after all other sections have been developed. The course description will be used in several instances such as Clara, the master schedule, the Prospectus, the website course description, and course outlines.

This course provides an understanding of the fundamental notions of linear algebra and vector geometry. It introduces concepts of matrix, vector, and multivariable systems of linear equations and their applications in the context of Social Science, Commerce and Economics.