# Course Outline – Seattle Central Community College

**Course Prefix & No.:** MATH220  
**Title:** Linear Algebra  
**Credits:** 5

**Division:** Science & Math  
**Program/Department:** Mathematics

<table>
<thead>
<tr>
<th>Max Class Size</th>
<th>Course length</th>
<th>Prerequisite(s):</th>
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<tbody>
<tr>
<td>32</td>
<td>11 weeks</td>
<td>In last 3 years: MATH126 with 2.0 or better.</td>
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**Total Contact Hours:** 55  
**Mode(s) of Delivery:**  
- [x] On campus self-contained  
- [ ] Correspondence  
- [ ] Tele-course  
- [ ] Online instruction  
- [ ] Hybrid (e.g., online and on campus)  
- [x] Other (please describe): 

**Course Description**  
This course is an introductory course in linear algebra covering standard topics such as solving linear systems with matrices, the geometry of vectors, matrix multiplication, vector spaces and subspaces, eigenvalues, etc.

**Learning Outcomes**  
As a result of taking this course, students will be able to:

- Solve linear systems using matrices and row reduction methods.
- Decompose systems of linear systems of equations into proper vector form.
- Apply rules of matrix algebra to multiply matrices and find their inverses, when possible.
- Describe and recognize linear transformations.
- Describe subspaces of R^n.
- Describe general vector spaces.
- Compute determinants.
- Compute eigenvalues and eigenvectors.
- Compute dot products.
- Find orthogonal projections and orthogonal bases in R^n.
- Apply concepts and techniques of linear algebra in a variety of contexts.
- Complete short proofs based on definitions and theorems.

**Program/Degree Outcomes**  
This course addresses the following program or degree outcomes:

- Develop and use skills in critical thinking, quantitative analysis
- Develop and use skills for in-person interactions with individuals and within groups.
- Use methods and modes of inquiry specific to mathematics
- Demonstrate effective oral and written communication, teamwork and collaboration in mathematical settings
- Demonstrate academic honesty and ethical behavior

**Topical Outline and/or Major**  
This course covers the following topics:

- **Systems of linear equations (using row reduction)**
| Divisions | Geometry of vectors (linear combinations, decomposing solutions of linear systems, linear independent sets of vectors)  
|          | Matrix Algebra (products of vectors and matrices, matrix multiplication, rules of matrix algebra, Markov chains, inverses of matrices)  
|          | Linear transformations (transformations in 2 and 3 dimensions)  
|          | Vector spaces (subspaces of $\mathbb{R}^n$, basis and dimension, subspaces associated with a matrix, abstract vector spaces)  
|          | Determinants (cofactors, properties of determinants)  
|          | Eigenvalues and Eigenvectors (characteristic polynomial, diagonalization)  
|          | Orthogonality (dot products and orthogonal vectors, projections in $\mathbb{R}^n$, least squares solutions, inner product spaces) |
| Distribution Area | Select One |
| Additional Information | This course may make use of computer algebra systems to visualize the material and do complex calculations. The emphases are on understanding concepts and applying those concepts. |
| CAC Use Only Special Designation(s) | ☒ QSR ☐ IS ☐ C ☐ GS ☐ US ☐ None |
| Outline Prepared by: Lawrence Morales | Date: 4/1/2011 |