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EDEL 551 Algebra and Functions

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Xavier University
Algebra and Functions
EDEL551
(3 semester hours)

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Childhood Education and Literacy Department Mission Statement:

Xavier University's Department of Childhood Education and Literacy is dedicated to the pursuit of knowledge and to the orderly discussion of critical issues confronting educators in a free, inquiry-based environment committed to current and relevant scholarship and research related to our profession. Xavier University seeks to create awareness of social justice in all disciplines through its emphasis on living the Jesuit tradition of intellectual, moral, and spiritual preparation. The candidates in the Early Childhood, Middle Childhood, Montessori and Literacy programs, through their academic and professional training, are prepared to value the lives of children regardless of racial, linguistic, socio-economic, religious, or ethnic background and to work with and value family and school structures in both urban, rural, and suburban settings. Special attention is given to developmentally effective practices and advocacy for all children, with ethical issues and values as expressed through the Jesuit tradition. Thus, the Childhood Education and Literacy preparation at Xavier University strives to send out into the education community candidates who are morally sensitive to the academic and social needs of our time, foster an appreciation for human diversity, reason critically, and think creatively. Candidates in the Childhood Education and Literacy Department are encouraged to develop and maintain a disposition toward lifelong learning in the profession of education and to the service of their students and their students' families and communities.

Course Description:

This course builds upon the prior course *Mathematics as a Second Language* and extends and reinforces the learning from that course. Participants will obtain deep understanding of the concept of a function, utilize functions in problem solving, appreciate the pervasiveness of the function idea in the K-8 mathematics curriculum as well as everyday life, and engage in a variety of problem-solving activities that relate directly to the K-8 mathematics classroom. Topics include functions, graphs, inverse functions, linear functions, the algebra and geometry of straight lines, solving linear equations and inequalities, and an introduction to nonlinear functions. In K-12 application of content, teachers will examine the Ohio Mathematics Common Core Standards and Model Curriculum in Number/ Number Sense and Algebraic Thinking and demonstrate an understanding of how the concepts associated with this strand of mathematics develop across the grades.

Course Outcomes: As a result of this course participants will:

- Continue their study of linear relationships from the previous course through problem solving that emphasizing the pattern, table of values, 2-step processes, formulas, and graphs that characterize the relationship and inverse relationship.
- Deepen their knowledge of slope and intercepts of a straight line, be able to find the equation of a straight line in various forms, and apply their knowledge of straight lines to problem solving.
- Gain a deep conceptual understanding of the function concept and understand patterns, tables, graphs, and formulas as manifestations of the function concept.
- Develop fluency in using function notation including domain, range, rule, independent and dependent variables, discrete and continuous variables, and determine when a function is one-to-one and when it is onto.
- Engage in problem solving involving functions throughout the course.
- Study the concept of an inverse function, determine when a function is invertible and be able to describe the inverse function conceptually, calculate the inverse function in examples from everyday life, calculate the inverse function in mathematical contexts by using the ideas from processes and inverse processes, and graph the inverse function.
- Apply their knowledge of multi-step processes from the previous course to understand composition of functions, and engage in problem solving related to composition of functions.
- Solve systems of simultaneous linear equations by at least two methods.
- Gain familiarity with the concept of inequality, and solve linear inequalities and systems of linear inequalities by algebraic and geometric methods.
- Study nonlinear functions such as the distance function (absolute value), step functions, polynomials of a low degree, $f(x)=1/x$ and indirect proportions, the inverse of the squaring function (with special attention to the domain) and cubing function, and functions related to the Pythagorean Theorem and the equation of a circle.
- Examine the function concept from the perspective of the K-8 classroom, become familiar with the, and demonstrate Ohio Mathematics Common Core Standards and Model Curriculum an understanding of how the concepts associated with this strand of mathematics develop across the grades.

Text book and Resources

1. Gross, Kenneth & Gross, Herbert (1999-2012). *Functions and algebra, a course for Elementary and middle school teachers*. Vermont Mathematics Initiative. .
2. National Governors Association Center for Best Practices, & Council of Chief State School Officers, (2010). *The Common Core State Standards for Mathematics*. Available online: <http://www.corestandards.org/the-standards/mathematics>
3. Ohio Department of Education, (2011). *The Common Core Ohio State Standards for Mathematics*. Available online. <http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDetail.aspx?page=3&TopicRelationID=1696&ContentID=126041>

COURSE POLICIES:

Professionalism: Professional behavior is that which is expected of all teachers and is what you have come to expect of your students. Students are required to demonstrate behavior consistent with a professional career. In particular, students are expected to adhere to the following guidelines:

Academic Honesty: The Childhood Education and Literacy Department values academic honesty. It is expected that each student will submit original work. Where others' works and ideas are used, citations must be included. Please refer to the *Xavier University Catalog* for the official statement and consequences.

Attendance: Arrive to class on time and stay for the entire day. The Xavier University catalogue states "In order to earn credit in any course for which he/she is registered, the student is required to attend classroom and laboratory exercises regularly and promptly. Lack of reasonable attendance as determined by the individual faculty member is reason for denial of credit for a course and possible course failure." Full attendance is required for credit. Special consideration will only be given to unexpected extreme situations.

Class Participation: All participants are expected to be actively engaged in classroom activities. Participants must contribute to class discussions, share ideas and questions, help other participants when possible and share solutions to class and homework problems.

Teamwork: Help others and participate in discussions groups and morning homework groups.

Attitude: Maintain a positive attitude. If you are feeling frustrated with some aspect of the course it is your responsibility to discuss this with Debbie, Sheila, Joy, or Susan.

Course Homework/Assignments and Reflective Portfolio: You are expected to work diligently on homework, to complete all assignments to the best of your ability and to go to office hours or ask for help from an instructor if the work is challenging for you. Show all your work on your homework solutions, put effort into making sure it is legible and make copies of your homework before handing it in. You will keep a working portfolio and will complete a reflective portfolio of your of the final versions of selected in-class assignments.

Growth/Effort: You are expected to show growth in mathematics, relative to where you were when you came into the program. Not everyone will be at the same place mathematically when they come into the course or at the end of the course, but everyone should make gains. If you feel that you are not making progress, it is your responsibility to make arrangements for additional learning experiences or one-on-one tutoring with an instructor.

Post Inventory Tests/Final Homework Packets: If the post inventory test indicates areas that have not been mastered you will be given an incomplete for the class and will need to sign a revision contract. You will be expected to view Khan Academy Videos to remediate areas of concern and complete the required assignment to demonstrate mastery of the content.

A similar contract will be signed if the final homework packet demonstrates areas that have not been mastered. You will be given an incomplete for the course and will be required to sign a revision contract. The contract will specify the work to be done, products to be submitted and the final deadline. Failure to do so will result in failure of the course.

Accommodations: *Besides office hours at Mayerson Center:* Xavier University's Learning Assistance Center can be reached by calling 745-3280. The Learning Assistance Center is located on the fifth floor of the Conaton Learning Commons, Suite 514. The office hours are from 8:30 – 5:30 daily. Please discuss necessary accommodations with the instructor.

Student Evaluation/Assessment

Grading will be based on the following expectations:

- Completing all problems and practice sets.
- Completing required readings, responses, and preparation for discussions prior to class meeting.
- Completing all assignments by the due date.
- Archiving all solutions to problems, in class presentations of solutions, and class notes in their working course portfolio. Participants will choose five problems to include in their Reflective Portfolio.
- Attending all classes, participating fully in class discussions and presentation of solutions, and being helpful to colleagues in learning from one another.

Work Products and Grades:

Homework (50%)

Nightly homework and end of the course homework packet.

Presentations and Participation (15%)

Throughout the course activities will be presented to the class for discussion and response. Participants will be expected to respond appropriately and effectively orally and in writing, based on content knowledge and pedagogical strategies.

Final Course Reflective Portfolio (25%)

Each participant will be required to submit a reflective portfolio containing revised copies of five problems that had an impact on their learning during this course. The revised problems should show multiple ways of solving the problem along with a written reflection of the impact this particular problem had on the participant.

Daily Exit Assessments (10%)

Grade Scale: Because this is a graduate course, students must receive a B- or better for credit.

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|----|-------|--------|-------|-------|-------|
| | A | 95-100 | A- | 93-94 | |
| B+ | 90-92 | B | 87-89 | B- | 85-86 |

EDEL 551 Functions and Algebra

Course Calendar

| DATE | TOPIC | ASSIGMENT |
|-------------------|---|---|
| Week One | Conversions & Slope | Complete Assigned Homework Problem(s) Read Module 1 |
| Week Two | Linear Functions | Complete Assigned Homework Problem(s) Read Modules 2 |
| Week Three | Learning Lab | |
| Week Four | Functions and Inverse Functions | Complete Assigned Homework Problems Read Modules 3 |
| Week Five | Solving Simultaneous Linear Equations | Complete Assigned Homework Problem s |
| Week Six | Learning Lab | |
| Week Seven | Inequalities and Interval Notation The Distance Function | Reread to More Completely Understand Modules 1-3. |
| Week Eight | Absolute Value Problems | Complete Homework Packet |
| Week Nine | Final | Final |