To increase the number of Southern Illinois teachers to be able to teach the dual credit courses, the Department of Mathematics is committed to develop the online versions of several existing graduate level courses. As some of the high school teachers are out of college/university for a while, we understand that they may experience some difficulty at the beginning of the program. Hence, we have proposed introductory level courses at the beginning to make their experiences relatively smooth.

To fulfil the requirements of the 'Certificate in Dual Credit Mathematics', the teachers must complete a minimum of 18 credit hours graduate level courses in the areas of pure and applied mathematics and statistics. Our plan is that the teachers be able to complete the certificate program by three semesters (two courses per semester). Teachers who are more ready may be able to finish the program sooner.

To support the continued and future growth of teachers, we plan to keep adding more courses to the list of available "online" graduate level courses. This program may eventually help teachers to acquire an MS degree in mathematics. Online instruction contains class notes, related videos, homework and tests. The strict guidelines of a math online course requires the teachers to continually keep up with the material. Mathematics professors are ready to provide the help they would need along the way.

Local teachers might like to attend the campus course rather than online and so we offer both versions of the same course whenever possible. However, many teachers prefer the online class because they do not like to drive far distances to attend the campus class.

The courses for the dual credit certificate program are: Math 483 (Engineering Statistics) and Math 460 (Transformation Geometry), Math 417 (Applied Matrix Theory) and Math 474 (Statistical Time Series), Math 419 (Abstract Algebra II) and Math 452 (Introduction to Analysis).

With successful completion of these courses, teachers will be able to teach the courses listed below quite comfortably as dual courses.

Dual Credit Courses to be taught in high schools: Math 101, 108, 109, 111, 139, 282.

Catalog Description of the Proposed Certificate Program

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Catalog description of required courses:

MATH 417-3 Applied Matrix Theory. Selected applications of matrices to physics, chemistry and economics. This material is also useful for engineering and computer science. Topics include matrix representation of symmetry groups, non-negative matrices and the subsidy problem, location of eigenvalues. Prerequisite: MATH 221 with C or better.

MATH 419-3 Introduction to Abstract Algebra II. A detailed study of polynomial equations in one variable. Solvable groups and the Galois theory of field extensions are developed and applied to extensions of the quadratic formula, proving the impossibility of trisecting an angle with only a straight-edge and compass, and to the basic facts about finite fields as needed in coding theory and computer science. Prerequisite: MATH 319 with C or better

MATH 452-3 Introduction to Analysis. A rigorous development of one-variable calculus providing the tools necessary for understanding all other advanced courses in analysis. Topics include: sets, axioms for the real numbers, continuity, limits, differentiation, the Riemann integral, infinite sequences and series of functions. Additional topics may include areas such as Riemann-Stieltjes integration or the analysis of multivariable functions. Prerequisite: MATH 352 with C or better.

MATH 460-3 Transformation Geometry. Geometry viewed as the study of properties invariant under the action of a group. Topics include collineations, isometries, Frieze groups, Leonardo`s Theorem, the classification of isometries of Euclidean and hyperbolic geometries. Recommended elective for secondary education majors in mathematics. Prerequisite: MATH 319 with C or better.

MATH 474-3 Time Series. An introduction to time series: AR, MA and ARIMA models; estimation, time series models. Prerequisite: MATH 480 or MATH 483 with C or better.

MATH 483-4 Mathematical Statistics in Engineering and the Sciences. Develops the basic statistical techniques used in applied fields like engineering, and the physical and natural sciences. Principal topics include probability; random variables; expectations; moment generating functions; transformations of random variables; point and interval estimation; tests of hypotheses. Applications include one-way classification data and chi-square tests for cross classified data. Prerequisite: MATH 250 with C or better