Enrollments at Illinois public universities are dropping across the state of Illinois. The five-year trend in undergraduate enrollments shows declines in nine of the twelve campuses ranging from 6% to 55%. Trends in graduate enrollments are even more pronounced with declines in eleven campuses ranging from 6% to 60%. Northeastern Illinois University (NEIU) is no exception.

Will these patterns continue? How can we plan for fluctuation in enrollments? How can we be proactive, especially in light of the pandemic? These are crucial questions for Illinois public universities that depend heavily on tuition revenue. While it is impossible to say for certain, enrollment forecasting has the potential to help answer such questions.

Enrollment forecasting is used across the country and by the National Center for Educational Statistics. There are a variety of methods used to assist university administrators who must make important decisions about budgetary planning and enrollment management. Information produced by enrollment forecasting can help inform these decisions. Our goal with this publication is to let you know about enrollment forecasting efforts at NEIU and our plans for the future.

During Fall 2019, an Enrollment Forecasting Group was created to improve enrollment forecasting at NEIU. Administrators and staff from the offices of Institutional Research and Assessment, Finance and Administration, University Budgets, and Enrollment Services, along with Mathematics and Economics faculty members, have been meeting to discuss enrollment forecasting at NEIU. Among our goals are increasing the accuracy of enrollment forecasts, applying forecasts to budgetary planning, and investigating additional statistical models for future forecasts.
Over the summer of 2019, forecasts for new and continuing undergraduate students were created. The model chosen for these forecasts was a seasonal Auto Regressive Integrated Moving Average (ARIMA) model, a standard model for forecasting non-stationary time series. Simply speaking, this ARIMA model uses previous enrollment to predict future enrollment. ARIMA models have the advantage of being simple to implement, and can be used to forecast multiple steps forward in time. In July 2019, the first forecasts were completed; in September, the fall enrollment figures were used to evaluate the accuracy of the forecasts.

The results of our first forecast are shown in Table 1. Total enrollment and continuing undergraduate enrollment predictions were quite accurate with both predictions slightly below actuals. Predictions for new undergraduate enrollment were slightly elevated when compared to actuals. After these encouraging results, the models were refined and enrollment data were updated to include fall and summer semesters. In mid-January 2020, spring semester enrollment figures were compiled, and the results of the spring semester forecast are shown in Table 2.

<table>
<thead>
<tr>
<th>Table 1: Fall 2019 Forecast Percent Error Analysis</th>
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<td>Population</td>
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<td>Total UG Enrollment</td>
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<th>Table 2: Spring 2020 Forecast Percent Error Analysis</th>
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While initial results are encouraging, it is important to keep in mind that past performance of a model is not a guarantee of future results. The ARIMA model operates under the assumption that the factors influencing enrollment in the recent past will remain largely unchanged into the near future. If this assumption is not satisfied, it is not reasonable to assume that forecasts will be accurate. Additionally, while ARIMA models are simple to implement, they do not take into account institutional or student characteristics, nor do they incorporate any macroeconomic or demographic data, such as cost of tuition, unemployment rates or state population numbers. In order to address the limitations of an ARIMA time series analysis, it is important to consider supplementing such forecasts with additional models.

This enrollment forecasting was done before the occurrence of the worldwide pandemic we are facing. This situation of course violates the assumption of the ARIMA model that “factors influencing enrollment in the recent past will remain largely unchanged.” It is likely that the pandemic will have a negative impact on Fall 2020 enrollment and this method of forecasting will not account for that impact. The Enrollment Forecasting Group will explore other models, such as linear regression, to understand the influence of the pandemic on enrollment at NEIU. We will also continue to monitor the impact of the pandemic on college enrollment nationwide and factor that into future modeling.