Doctoral students in the developmental program should demonstrate the following sets of skills and competence in quantitative research methods. These include:

1) knowledge of sampling (including types of sampling and the corresponding implications of sampling choices for external validity) and of

2) A wide range of types of research design and corresponding implications of those choices for the internal validity and the external validity of the resulting study. Doctoral students should be prepared to demonstrate their understanding of ways to balance competing objectives of internal and external validity when designing and conducting a given study. They should also be able to consider issues of feasibility and statistical power when designing a research study.

3) Grounds on which researchers can (and cannot) make causal inferences. Students should be able to demonstrate a clear and comprehensive understanding of a range of commonly encountered threats to causal inferences, and ways to address those threats, both through design choices and statistical choices.

4) types of measurement (including observational measures, self-report measures, physiological and neuropsychological measures, and direct assessments) as well as criteria for evaluating good, adequate, and poor measurement effort. Students should also be able to demonstrate critical reasoning regarding the implications of measurement for construct validity and internal validity.

5) proficiency in carrying out basic statistical analyses (e.g. descriptive analyses, correlational analyses, factor analyses, analyses of variance, and OLS regression analyses). This would include a clear understanding of ways to test for the role of proposed mediators and moderators with multivariate data sets.

6) working competence in interpreting results from basic statistical analyses listed in section 4 (above) as well as interpreting results from more specialized, higher-order statistical methods (e.g. structural equation modeling, analysis of change over time, or multi-level hierarchical linear models, as examples).

7) some background knowledge of statistical theory and key concepts such as distinguishing research aims of description, prediction and causal inference, emic versus etic approaches to measurement and modeling, Type I and Type II error, the importance of adequate statistical power, the meaning and interpretability of effect size (e.g. familiarity with canonical concepts developed by Fisher, Neyman, Cook, Campbell, and Cohen)
An example of a sampling question might be:
In considering data on the prevalence of television watching in American households with young children, critics have suggested that phone surveys might be inaccurately estimating the level of television watching because those surveys have excluded “cell-phone only” households. You have been hired by Abt Associates to assist with a new phone survey that will assess parents’ reports of the amount of time their children ages 0-18 spend, watching TV, in “cell-phone only” households in the city of New York. You need to first define your sampling frame.

1. Abt colleagues aren’t sure what you’re talking about. First define a “sampling frame.”
2. What would you recommend to Abt Associates to do to generate an accurate sampling frame?
3. Abt experiences budget cuts just as you are about to sample your respondents, and they use only a portion of your sampling plan. Are these changes that have been made by Abt going to affect the internal validity of your findings, or the external validity of your findings? Take three or four sentences to explain your answer.

An example of a question focusing on measurement might be:
You have developed a measure of health literacy for a study of risk taking in adolescents. This measure is administrated once to the sample of 1500 participants. The scale consists of 20 5-point Likert items. Before you utilize the measure in your statistical analysis to ANSWER THE STUDY QUESTIONS, describe how you would

1. determine how many constructs underlie the measure.
2. If there is more than one factor, how would you create a score or scores?
3. How would you determine whether the measure possess appropriate levels of reliability and validity?

An example of a statistics question might be:
Attached, please find a data set with the following 20 variables available for analysis. Pick ONE of the following research teams to “join” and run the analyses that are requested, below.
Team 1: You are part of a research team that is currently exploring quality of parent-child relationship as a predictor of 2-year-olds’ vocabulary scores. Your advisor has asked you to run some preliminary analyses with the attached secondary data set to detect whether this is a promising line of research. Run a linear regression analysis with vocabulary scores as the dependent variable and the following 4 variables as predictors. These include maternal age, maternal education, quality of mother-child interaction, and child gender. Print out the regression table and write a brief results section to inform your team of your findings.
Team 2: You are currently part of a research team that is considering the role of girls’ enrollment in “abstinence-only” versus “abstinence + ” classes (termed “sex ed type”) on their report of willingness to engage in unprotected sex. Your advisor has asked you to run some preliminary analyses with the attached secondary data set to detect whether this is a promising line of research. Run a set of MANOVAs to detect whether enrollment in these two different forms of sex ed as well as family SES, girls’ grade point average, and family religious affiliation predict girls’ attitudes towards unprotected sex. In addition, include a test of the hypothesis that the role of sex ed may be moderated by family religious affiliation. Print out a table of means and standard deviations for both groups and write a brief results section to inform your team of your findings.