The Quantitative Reasoning Requirement at the Fletcher School

Analysis based on careful reasoning and the appropriate interpretation of data and events is the hallmark of good scholarship, useful policy evaluation, and well-informed decision making. In many fields, such as economics, political science, environmental studies, health, or education, scholars and policy-makers use quantitative data, combined with statistical methods and models that use mathematical techniques.

The quantitative reasoning requirement is designed to enable students to have a basic command of these methods and techniques in order to enhance their learning at Fletcher and, ultimately, to make them more effective in their careers.

The requirement can be met in different ways that may be more tailored to the interests of individual students. Currently there are 5 courses that can be used for the Quantitative Reasoning Requirement: students who did not pass one of the two placement exams (either Statistics or Quantitative Methods) must take one of these courses to satisfy the requirement. Obviously, students are encouraged to—and many do—take more than one of these courses. Please talk to your advisor about the usefulness of one or more of these courses to your career goals.

Statistics (EIB B205)

This course provides an overview of classical statistical analysis and inference. The goal is to provide students with an introduction to statistical thinking, concepts, methods, and vocabulary. This will provide some tools for dealing with statistical methods that may be encountered in course work or research while at the Fletcher School, including regression analysis, which is covered at the end of the course. In addition, the course will give students entrée to research and professional literature that utilize statistical methods and thinking.

Analytic Frameworks for International Public Policy Decisions (DHP P203)

Most students will find themselves in positions to make or provide advice regarding difficult policy-related decisions soon after they graduate. This course is an introduction to the basic tools of policy analysis and decision making, providing students with analytic skills to make policy decisions in many types of organizations. Students learn powerful quantitative analytic techniques that they apply to a wide variety of policy issues in national and international settings. Techniques covered in this class include decision trees, basic probability and understanding uncertainty, game theory, inter-temporal decision making, and tipping models. Students learn about different types of models and how to choose the model that best represents the problem and tradeoffs at hand. Case studies from different parts of the world and covering a wide range of policy issues are used to learn the policy analysis tools while applying them to real world

problems. Students also learn about the different criteria used for policy decision making. Most importantly, students learn the role of models in policy decisions and the importance of judgment and careful evaluation in difficult problems with real consequences. This course does not require any background in economics, statistics, or advanced mathematics.

Quantitative Methods (EIB E210m)

This module teaches the fundamental mathematical tools that are used in economics. These tools include functions, differential calculus, optimization, and difference equations. Each mathematical tool is taught in the context of economic applications. For example: the discussion on functions focuses on the topics of rates of growth and time-discounting; there is extensive discussion of the use of differential calculus to gauge the responsiveness of economic variables to policies or events as well as to understand the basic economic idea of *ceteris paribus* (all else held equal); mathematical methods of optimization are shown to be a central tool of economic analysis; and dynamic analysis is taught in the context of issues like the determination of stock prices and exchange rates.

Quantitative Methods is a seven-week module that meets three times per week (instead of the usual twice per week). It is a prerequisite for the Microeconomics module that follows it. The material in this course is utilized in virtually all mid-level and upper-level economics courses at Fletcher.

Marketing Research and Analysis (EIB B262)

This course proposes a comprehensive, hands-on approach to designing and conducting research in general. While the context of this course is rooted in the field of business and marketing in particular, its pertinence and applicability extends to all audiences and fields. Best practices and proper design of research methods, fieldwork, questionnaires, and surveys (e.g., online surveys) are covered, making the content of this course attractive across disciplines. Both qualitative (e.g., focus groups, depth interviews, projective techniques) and quantitative approaches (e.g., basic statistics; contingency tables; Anovas and Ancovas; OLS and logistic regressions; cluster, discriminant, and factor analysis) are presented.

Students are exposed to the various stages of the research process from recognizing the need for research and defining the problem to analyzing the data, interpreting the results, and presenting the findings. Various techniques for market analysis are introduced "hands on" via a series of computer exercises and cases. Students learn how to use the SPSS software application and develop Excel based models. This course should arm students with a sound understanding of the

overall research process and give them the tools and reasoning to design and conduct their own research in a self-sufficient way.

Econometrics (EIB E213)

Multiple regression analysis and related econometric methods are frequently employed by social scientists and decision-makers in almost every field that Fletcher graduates are likely to enter. Anyone can run a regression, and many people do, but only researchers well-trained in econometrics can produce *meaningful* regression results and interpret them wisely. Decision-makers who do not wish to make costly mistakes based on poorly formulated or incorrectly interpreted regression results must understand the many reasons why econometric estimates may be misleading, and the skills econometric researchers must employ to minimize the risk of drawing misleading conclusions. This course equips students with the basic knowledge, intuition and experience necessary for critical reading of econometric research produced by others and for independent econometric research. Students should enter the course familiar with statistics at the level of EIB B205 and familiar with functions and partial derivatives at the level of EIB E210M.