

QUANTITATIVE/FORMAL REASONING COURSES

Williams students should be adept at reasoning mathematically and abstractly. The ability to apply a formal method to reach conclusions, to use numbers comfortably, and to employ the research tools necessary to analyze data lessen barriers to carrying out professional and economic roles. Prior to their senior year, all students must satisfactorily complete a Quantitative/Formal Reasoning (QFR) course—those marked with a “(Q)”. Students requiring extra assistance (as assessed during First Days) are normally placed into Mathematics 100/101/102, which is to be taken before fulfilling the QFR requirement.

The hallmarks of a QFR course are the representation of facts in a language of mathematical symbols and the use of formal rules to obtain a determinate answer. Primary evaluation in these courses is based on multistep mathematical, statistical, or logical inference (as opposed to descriptive answers).

Courses that may be used to meet the requirement in 2016-2017:

ASTR 111(F) Introduction to Astrophysics (Q)
BIMO 321(F) Biochemistry I: Structure and Function of Biological Molecules (Q)
BIMO 322(S) Biochemistry II: Metabolism (Q)
BIOL 202(F) Genetics (Q)
BIOL 203(F) Ecology (Q)
BIOL 302(F) Communities and Ecosystems (Q)
BIOL 305(S) Evolution (Q)
BIOL 319(F) Integrative Bioinformatics, Genomics, and Proteomics Lab (Q)
CHEM 151(F) Introductory Chemistry (Q)
CHEM 153(F) Concepts of Chemistry (Q)
CHEM 155(F) Principles of Modern Chemistry (Q)
CHEM 156(S) Organic Chemistry: Introductory Level (Q)
CHEM 368T(S) Computational Chemistry and Molecular Spectroscopy (Q)
CSCI 107(S) Creating Games (Q)
CSCI 109(F) The Art and Science of Computer Graphics (Q)
CSCI 134(F,S) Introduction to Computer Science (Q)
CSCI 135(F,S) Diving into the Deluge of Data (Q)
CSCI 136(F,S) Data Structures and Advanced Programming (Q)
CSCI 237(F,S) Computer Organization (Q)
CSCI 256(S) Algorithm Design and Analysis (Q)
CSCI 334(S) Principles of Programming Languages (Q)
CSCI 356T(F) Advanced Algorithms (Q)
CSCI 361(F) Theory of Computation (Q)
CSCI 371(F) Computational Graphics (Q)
CSCI 373(F,S) Artificial Intelligence (Q)
CSCI 374T(F) Machine Learning (Q)
CSCI 375(F,S) Natural Language Processing (Q)
CSCI 432(S) Operating Systems (Q)
CSCI 434T(F) Compiler Design (Q)
ECON 110(F,S) Principles of Microeconomics (Q)
ECON 120(F,S) Principles of Macroeconomics (Q)
ECON 213(S) Introduction to Environmental and Natural Resource Economics (Q)
ECON 232(S) Financial Markets, Institutions and Policies (Q)
ECON 251(F,S) Price and Allocation Theory (Q)
ECON 252(F,S) Macroeconomics (Q)
ECON 255(F,S) Econometrics (Q)
ECON 364(F) Theory of Asset Pricing (Q)
ECON 378(F) Long-Run Perspectives on Economic Growth (Q)
ECON 381(S) Global Health Policy Challenges (Q)
ECON 384(S) Corporate Finance (Q)
ECON 385(S) Games and Information (Q)
ECON 387(S) Economics of Climate Change (Q)
ECON 471(F) Topics in Advanced Econometrics (Q)
ECON 472(F) Macroeconomic Instability and Financial Markets (Q)
ECON 477(S) Economics of Environmental Behavior (Q)
ECON 514(S) Tax Policy in Emerging Markets (Q)
ECON 523(S) Program Evaluation for International Development (Q)
GEOS 215(S) Climate Changes (Q)
GEOS 301(F) Structural Geology (Q)
MATH 130(F,S) Calculus I (Q)
MATH 140(F,S) Calculus II (Q)
MATH 150(F,S) Multivariable Calculus (Q)
MATH 151(F) Multivariable Calculus (Q)
MATH 200(F,S) Discrete Mathematics (Q)
MATH 250(F,S) Linear Algebra (Q)
MATH 293T(F) Undergraduate Research Topics in Representation Theory (Q)
MATH 309(S) Differential Equations (Q)
MATH 311(F) Chaos and Dynamical Systems (Q)

MATH 313(S) Introduction to Number Theory (Q)
 MATH 316(S) Protecting Information: Applications of Abstract Algebra and Quantum Physics (Q)
 MATH 318T(F) Numerical Problem Solving (Q)
 MATH 331(S) The little Questions (Q)
 MATH 341(F) Probability (Q)
 MATH 350(F,S) Real Analysis (Q)
 MATH 351(F) Applied Real Analysis (Q)
 MATH 355(F,S) Abstract Algebra (Q)
 MATH 372(S) Complex Analysis (Q)
 MATH 374T(F) Topology (Q)
 MATH 377(F) Operations Research (Q)(W)
 MATH 378(S) Computational Algebraic Geometry (Q)
 MATH 402(S) Measure Theory and Probability (Q)
 MATH 411(S) Commutative Algebra (Q)
 MATH 431(F) Nonlinear Waves, Solitons (Q)
 MATH 453(S) Introduction to the Theory of Partial Differential Equations (Q)
 MATH 456(F) Representation Theory (Q)
 STAT 101(F,S) Elementary Statistics and Data Analysis (Q)
 STAT 201(F,S) Statistics and Data Analysis (Q)
 STAT 202(F) Introduction to Statistical Modeling (Q)
 STAT 346(F,S) Regression and Forecasting (Q)
 STAT 356(S) Time Series Analysis (Q)
 STAT 360(S) Statistical Inference (Q)
 STAT 365(F) Bayesian Statistics (Q)
 STAT 440(F) Categorical Data Analysis (Q)
 STAT 442(S) Computational Statistics and Data Mining (Q)
 PHIL 203(F) Logic and Language (Q)
 PHYS 108(F) Energy Science and Technology (Q)
 PHYS 131(F) Introduction to Mechanics (Q)
 PHYS 132(S) Electromagnetism and the Physics of Matter (Q)
 PHYS 141(F) Mechanics and Waves (Q)
 PHYS 142(S) Foundations of Modern Physics (Q)
 PHYS 151(F) Seminar in Modern Physics (Q)
 PHYS 201(F) Electricity and Magnetism (Q)
 PHYS 202(S) Vibrations, Waves and Optics (Q)
 PHYS 210(S) Mathematical Methods for Scientists (Q)
 PHYS 301(F) Quantum Physics (Q)
 PHYS 302(S) Stat Mechanics & Thermodynamics (Q)
 PHYS 312(S) Philosophical Implications of Modern Physics (Q)
 PHYS 402T(S) Applications of Quantum Mechanics (Q)
 PHYS 411T(F) Classical Mechanics (Q)
 PHYS 451(S) Condensed Matter Physics (Q)
 POEC 253(F) Empirical Methods in Political Economy (Q)
 PSCI 211(F) Do the People Govern? U.S. Public Opinion and Mass Political Behavior (Q)
 PSYC 201(F,S) Experimentation and Statistics (Q)