ECONOMICS BA/ MATHEMATICS, BS - DUAL DEGREE

Introduction

Please click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/economics/) to see Economics department information or here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/mathematical-statistical-sciences/) for Mathematical and Statistical Sciences department information.

A solid training in the mathematical and statistical sciences is fundamental to optimally prepare economics students for graduate school. A dual degree in economics and mathematics will substantially increase program quality and career prospects for our students, as well as enhance the reputation of the economics program at CU Denver. Similarly, a solid training in quantitative and qualitative economic principles offers significant benefits to mathematics majors who seek industrial and/or consulting positions.

These degree requirements are subject to periodic revision by the academic department, and the College reserves the right to make exceptions and substitutions as judged necessary in individual cases. Therefore, the College strongly urges students to consult regularly with their major advisor and CLAS advisor to confirm the best plans of study before finalizing them

Program Delivery

- This is an on-campus program.

Declaring This Major

- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/records-registration/registration/declare-change-major-minor/) to go to information about declaring a major.

General Requirements

To earn a degree, students must satisfy all requirements in each of the three areas below, in addition to their individual major requirements.

- CU Denver General Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation/general-graduation-requirements/)
- CU Denver Core Curriculum (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation-undergraduate-core-requirements/)
- College of Liberal Arts & Sciences Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/#graduationrequirementstext)
- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/) for information about Academic Policies

Program Requirements

1. Students must complete a minimum of *72* hours with a minimum of 30 ECON credit hours and a minimum of 39 MATH credit hours.
2. Students must complete a minimum of 27 upper division (3000-level and above) ECON credit hours and a minimum of 27 upper division (3000-level and above) MATH credit hours.
3. Students must earn a minimum grade of C- (1.7) in all major courses taken at CU Denver and must achieve a minimum cumulative GPA of 2.0 in ECON courses and a cumulative GPA of 2.25 in MATH courses. All graded attempts in required and elective courses are calculated in the major GPA. Students cannot complete major or ancillary course requirements as pass/fail.
4. Students must complete a minimum of 18 ECON credit hours including ECON 4811 Introduction to Econometrics, with CU Denver faculty. Once a student has enrolled at CU Denver, no more courses in the major can be taken outside the CU Denver Economics Department. This includes courses offered at Metropolitan State University. The department reserves the right to require a demonstration of competence for any core courses not taken from CU Denver faculty. Additionally, the Department of Mathematical and Statistical Sciences requires that at least 15 upper-division Mathematics credits must be taken at CU Denver.

Program Restrictions, Allowances and Recommendations

1. In addition to the CLAS residence requirements, the Economics Department requires that all courses other than ECON 2012 Principles of Economics: Macroeconomics and ECON 2022 Principles of Economics: Microeconomics require written department approval to be transferred in as satisfying major requirements.
2. A student who attempts the dual degree but who does not fulfill all requirements for the Mathematics BS will need to complete the requirements for the Economics BA as a stand-alone degree. A Mathematics elective will substitute for one of the six economics electives only if all requirements of the Mathematics major are met.

Required Courses

Economics

Code	Title	Hours
Take all of the following Economics courses:		*15*
ECON 2012	Principles of Economics: Macroeconomics	3
ECON 2022	Principles of Economics: Microeconomics	3
ECON 4071	Intermediate Microeconomic Theory	3
ECON 4081	Intermediate Macroeconomic Theory	3
ECON 4811	Introduction to Econometrics	3

Mathematics

Code	Title	Hours
Take all of the following Mathematics courses:		*30*
MATH 1401	Calculus I	4
MATH 2411	Calculus II	4
MATH 2421	Calculus III	4
MATH 3000	Introduction to Abstract Mathematics	3
MATH 3191	Applied Linear Algebra	3
MATH 3200	Elementary Differential Equations	3

MATH 3382	Statistical Theory	3
MATH 4310	Introduction to Real Analysis I	3
MATH 4779	Math Clinic	3

Programming Requirements

Code	Title	Hours
Take one of the following programming requirements:		*3-4*
MATH 1376	Programming for Data Science	3
CSCI 1410 & CSCI 1411	Fundamentals of Computing and Fundamentals of Computing Laboratory	4

Electives

Economics

Code	Title	Hours
Take six upper division level Economics elective courses or five Economics elective courses plus one Mathematics elective course from the list below.		*15*
A minimum of four of these courses must be at the 4000-level.		
ECON 3801 Introduction to Mathematical Economics and ECON 3811 Statistics with Computer Applications cannot be counted as electives.		
One of the following approved Mathematics electives can be double counted as the sixth Economics elective.		
ECON 3050	Decision Making	3
ECON 3100	Economics of Race and Gender	3
ECON 3300	Economics of Crime and Punishment	3
ECON 3366	Managerial Economics	3
ECON 3400	Economics of Sex and Drugs	3
ECON 3415	Issues in International Trade and Finance	3
ECON 3770	Issues in Economic Development	3
ECON 4001	Topics in Economics	3
ECON 4030	Data Analysis with SAS	3
ECON 4050	Special Economic Problems	3
ECON 4090	History of Economic Thought	3
ECON 4110	Money and Banking	3
ECON 4150	Economic Forecasting	3
ECON 4210	Public Finance	3
ECON 4240	Economic Policy Analysis	3
ECON 4310	Managerial Economics	3
ECON 4318	Urban Economics	3
ECON 4320	Financial Economics	3
ECON 4410	International Trade	3
ECON 4420	International Finance	3
ECON 4430	Economic Growth	3
ECON 4461	Economic Incentives	3
ECON 4530	Economics of Natural Resources	3
ECON 4540	Environmental Economics	3
ECON 4550	Game Theory and Economic Applications	3
ECON 4610	Labor Economics	3
ECON 4640	Sports Economics	3
ECON 4660	Health Economics.	3
ECON 4670	Economics of Population and Growth	3
ECON 4740	Industrial Organization	3
ECON 4770	Development Economics	3
ECON 4812	Advanced Econometric Methods	3
MATH 3301	Introduction to Optimization	3
MATH 3302	Simulation in Operations Research	3
MATH 4390	Game Theory	3
MATH 4387	Applied Regression Analysis	3
MATH 4650	Numerical Analysis I	3
MATH 4733	Partial Differential Equations	3
MATH 4810	Introduction to Probability	3
MATH 5350	Mathematical Theory of Interest	3

Mathematics

Code	Title	Hours
Take four upper division level Mathematics elective courses or three Mathematics elective course plus one Economics elective course from the list of approved Economics electives below.		*9*
Excluding MATH 3195 Linear Algebra and Differential Equations, MATH 3511 Mathematics of Chemistry, MATH 3800 Probability and Statistics for Engineers, and MATH 4830 Applied Statistics.		
One of the following approved Economics electives can be double counted as the fourth Mathematics elective.		
ECON 4030	Data Analysis with SAS	3
ECON 4110	Money and Banking	3
ECON 4150	Economic Forecasting	3
ECON 4320	Financial Economics	3
ECON 4430	Economic Growth	3
ECON 4550	Game Theory and Economic Applications	3
ECON 4610	Labor Economics	3
ECON 4740	Industrial Organization	3
MATH 3041	Fundamental Mathematics: Algebra, Probability and Data Analysis	3
MATH 3210	Higher Geometry I	3
MATH 3301	Introduction to Optimization	3
MATH 3302	Simulation in Operations Research	3
MATH 3376	Data Wrangling & Visualization	3
MATH 3440	Introduction to Symbolic Logic	3
MATH 4010	History of Mathematics	3
MATH 4015	Capstone Course for Secondary Teachers	3
MATH 4027	Topics in Mathematics	3
MATH 4110	Theory of Numbers	3
MATH 4140	Introduction to Modern Algebra	3
MATH 4320	Introduction to Real Analysis II	3
MATH 4337	Intro to Statistical and Machine Learning	3
MATH 4387	Applied Regression Analysis	3
MATH 4388	Machine Learning Methods	3
MATH 4390	Game Theory	3
MATH 4394	Experimental Designs	3
MATH 4408	Applied Graph Theory	3
MATH 4409	Applied Combinatorics	3
MATH 4450	Complex Variables	3
MATH 4650	Numerical Analysis I	3
MATH 4660	Numerical Analysis II	3
MATH 4733	Partial Differential Equations	3

MATH 4791	Continuous Modeling	3
MATH 4792	Probabilistic Modeling	3
MATH 4793	Discrete Math Modeling	3
MATH 4794	Optimization Modeling	3
MATH 4810	Introduction to Probability	3
MATH 4820	Introduction to Mathematical Statistics	3
MATH 5350	Mathematical Theory of Interest	3

To learn more about the Student Learning Outcomes for this program, please visit our website (https://clas.ucdenver.edu/economics/programs/bachelor-arts/).

To review the Degree Map for this program, please visit our website (https://www.ucdenver.edu/student/advising/undergraduate/degree-maps/clas/).