

## REQUIREMENTS FOR THE BA ECONOMICS MAJOR WITH **QUANTITATIVE EMPHASIS**

UNIVERSITY OF COLORADO BOULDER

The Economics Major with Quantitative Emphasis is designed for well-qualified economics majors having an interest in courses with quantitative content both within the Economics Department and in other departments. This emphasis is recommended for Economics majors who are considering careers or graduate programs in theoretical and applied economics. Students completing the emphasis will receive a certificate from the Economics Department upon graduation. Upon graduation, the transcript will identify this emphasis as an “option” accomplished by students who have successfully completed it.

The Quantitative Emphasis may be added to the Economics major track after the student has completed at least two of the following intermediate-level courses (ECON 3070, 3080 and/or 3818), and attains at least a 3.0 GPA in the economics major and for two of the three stated courses. Students interested in adding this emphasis should contact their Economics advisor once they are in compliance with these conditions. All Economics and ancillary courses applied to the emphasis must be completed with grades of C- or better. A student’s major GPA must be at or above 3.000 at the time of graduation for the emphasis certificate to be awarded.

Students must complete **at least 32 hours of Economics courses** plus **16-18 hours of mathematics-related ancillary course work** from outside the Economics Department. ECON 1078 and 1088 do not count toward either the minimum economics credit requirement or the Econ major GPA calculation. With presentation of a course syllabus, the Associate Chair for Undergraduate Studies will consider topically relevant courses on a case-by-case basis for fulfillment of the required ancillary course work in substitution for those listed below. Please contact your Economics advisor for further assistance. Transfer students must complete at least 6 hours of this ancillary course work at the University of Colorado Boulder.

### I. **REQUIRED ECONOMICS COURSES**

#### A. Lower Division – Econ. Requirements

ECON 2010 Principles of Microeconomics and ECON 2020 Principles of Macroeconomics (8 hrs.)

#### Lower Division - Math Requirements<sup>++</sup>

- Choose one
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|----------|---|
| Option 1 | ECON 1088 <u>Math Tools for Economists 2</u> (3 hrs.) <i>Prerequisite: ECON 1078, Math Tools for Economists 1</i>   |
| Option 2 | MATH 1330 <u>Calculus for Social Sciences/Business</u> (4 hrs.) <i>Prerequisite: MATH 1011, College Algebra</i>     |
| Option 3 | MATH 1300 <u>Analytic Geometry and Calculus 1</u> (5 hrs.) <i>Prerequisite: MATH 1150, Pre-calculus Mathematics</i> |
| Option 4 | Department-approved equivalents or substitution   |

*\*For students matriculating before Fall 2017, an ALEKS Math Assessment Score of 61% is sufficient to enroll in ECON 1088 and MATH 1330. A Score of 76% is sufficient for MATH 1300. For students matriculating Fall 2017 and later, placement is based on assessed math background. **However, discussion of appropriate math enrollment with an Economics advisor is highly recommended.***

**Quantitative Emphasis students are required to complete MATH 1300 and MATH 2300 or equivalents, plus 9-10 credit hours of additional mathematics courses. See REQUIRED MATHEMATICS COURSES below.**

#### B. Upper Division Requirements

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|------------|------------|--|
| Take all   | ECON 3070  | <u>Intermediate Microeconomic Theory</u> (4 hrs.) <i>Prerequisites: ECON2010 &amp; Calculus</i>                          |
|            | ECON 3080  | <u>Intermediate Macroeconomic Theory</u> (3 hrs.) <i>Prerequisites: ECON2020 &amp; Calculus</i>                          |
|            | ECON 3818* | <u>Intro. to Economics Statistics with Computer Applications</u> (4 hrs.) <i>Prerequisites: ECON 2020 &amp; Calculus</i> |
| Choice of: | ECON 4818  | <u>Intro. to Econometrics</u> (3 hrs.) <b>OR</b> ECON 4848 <u>Applied Econometrics</u> (3hrs)                            |
|            |            | <i>Pre-requisites for both courses: ECON 3070 &amp; ECON 3818</i>  |

*\*APPM 4520, APPM 4570, CHEN 3010, CVEN 3227, MATH 4520, CSCI 3022 are approved substitutes for ECON 3818. Students are not required to complete a replacement economics course when applying an approved substitute statistics course.*

#### C. Quantitative Courses in Economics (6 hrs.) Choose two

ECON 4808 Intro. to Mathematical Economics (3 hrs.) **and**

ECON 4818\* Intro. to Econometrics (3 hrs.) **or**  
 ECON 4848\* Applied Econometrics (3hrs.) **or**  
 ECON 4858 Financial Econometrics (3hrs.)

*\*Note that students who use ECON 4818 to satisfy the Econometrics requirement in Part B (Upper Division Requirements), may use ECON 4848 to satisfy the Part C quantitative course requirement. Students who use ECON 4848 to satisfy the Econometrics requirement in Part B, may use ECON 4818 to satisfy the Part C quantitative course requirement.*

D. Elective Courses in Economics

6 credit hours of 4000-level economics electives (9 hours if transferring six credits of micro and macro Principles courses).

II. **REQUIRED MATHEMATICS COURSES**

**Note:** Many of the following courses listed below have prerequisites. Students are responsible for completing prerequisites before enrolling in these courses.

A. Required Calculus Courses

Take all	MATH 1300	<u>Analytic Geometry and Calculus 1</u> (5 hrs.)
	MATH 2300	<u>Analytic Geometry and Calculus 2</u> (5 hrs.)
	MATH 2400	<u>Calculus 3</u> (4 hrs.) <b>OR</b> <u>MATH 2130 Introduction to Linear Algebra</u> (3 hrs)

Note: APPM 1350 and APPM 1360 may substitute for MATH 1300 and 2300, respectively. APPM 2350 and APPM 2360 may substitute for MATH 2400 AND 2130, respectively.

B. Mathematics, Applied Mathematics and Computer Science Courses

At least three credit hours selected from courses listed below:

MATH 2400	<u>Calculus 3</u> (4 hrs.)
MATH 2130	<u>Intro. to Linear Algebra</u> (3 hrs.)
MATH 3001	<u>Analysis 1</u> (3 hrs.)
MATH 4001	<u>Analysis 2</u> (3hrs)
MATH 4120	<u>Introduction to Operations Research</u> (3 hrs.)
MATH 3430	<u>Ordinary Differential Equation</u> (3 hrs.)
MATH 4510	<u>Introduction to Probability Theory</u> (3 hrs.)
MATH 4520	<u>Introduction to Mathematical Statistics</u> (3 hrs.)
MATH 4540	<u>Introduction To Time Series</u> (3 hrs.)
APPM 4570	<u>Statistical Methods</u> (3 hrs.)
APPM 4580	<u>Statistical Methods for Data Analysis</u> (3 hrs.)
CSCI 4502	<u>Data Mining</u> (3 hrs.)
CSCI 2820	Linear Algebra with Computer Science Applications

The following table lists approved substitutes for some courses listed above:

<u>Course</u>	<u>Substitutes</u>
<b>MATH 2400</b> <u>Calculus 3</u> (4 hrs.)	APPM 2350 <u>Calculus 3 for engineers</u> (4 hrs.)
<b>MATH 2130</b> <u>Intro. to Linear Algebra</u> (3 hrs.)	APPM 2360 <u>Intro. To Diff. Eq. with Linear Algebra</u> (3 hrs.)
<b>MATH 3001</b> <u>Analysis 1</u> (3 hrs.)	APPM 4440 <u>Undergraduate Applied Analysis 1</u> (3 hrs.)
<b>MATH 4001</b> <u>Analysis 2</u> (3hrs)	APPM 4450 <u>Undergraduate Applied Analysis 2</u> (3 hrs.)
<b>MATH 4120</b> <u>Introduction to Operations Research</u> (3 hrs.)	APPM 4120 <u>Intro. to Operations Research</u> (3hrs.)
<b>MATH 4510</b> <u>Introduction to Probability Theory</u> (3 hrs.)	APPM 3570 <u>Applied Probability</u> (3 hrs.)
<b>MATH 4520</b> <u>Introduction to Mathematical Statistics</u> (3 hrs.)	APPM 4520 <u>Introduction to Mathematical Statistics</u> (3 hrs.)
<b>MATH 4540</b> <u>Introduction To Time Series</u> (3 hrs.)	APPM 4540 <u>Introduction to Time Series</u> (3hrs.)

- MATH 2400 and MATH 2130 (and their substitutes) may not be used to satisfy both requirements II.A and II.B
- Students considering pursuing graduate programs in theoretical and applied economics are encouraged to take MATH 2400, MATH 2130, MATH 3001 (pre-requisite: MATH 2001) and MATH 4001.