**Requirements for an Economics Major**

**Effective for Majors declared after 1/1/2018**

**Students must take at least 40 semester hours of economics. *A GPA of 2.5 or above in economics courses taken at CU Denver is required for graduation.* No pass-fail grades count toward the major.**

**Required Courses**

**ECON 2012 Principles of Macroeconomics**

**ECON 2022 Principles of Microeconomics**

**ECON 3801 Introduction to Math Economics—Note: Completion of MATH 2411, Calculus**

**II, with a grade of B or higher will satisfy the ECON 3801 requirement. If a student completes ECON 3801, and then completes MATH 2411, ECON 3801 will be counted as an Economics 3000-level elective.  However, if a student has already completed MATH 2411 with a B or better, and then takes ECON 3801, ECON 3801 *will not* be counted as an Economics elective.**

**ECON 3811 Statistics with Computer Applications**

**ECON 4071 Intermediate Microeconomic Theory**

**ECON 4081 Intermediate Macroeconomic Theory**

**ECON 4811 Introduction to Econometrics**

**Students must receive a grade of C- or better in all of their required courses.**

**Elective Courses**

**Students must choose six other three-semester hour economics courses to complete the hours required for the Economics major. *Four of these electives must be taken at the 4000 or higher* level. In short, a maximum of only two electives at the 3000 or lower level can count toward the six-elective-course requirement. Students must receive a grade of D– or better in their elective courses, but only one grade below a C– will count toward the fulfillment of the major requirements.**

**Outside Courses**

**It is also strongly recommended that Economics majors take at least a minor in Mathematics. A dual major in Economics and Mathematics is preferred. Dual Majors in Economics and Mathematics are highly sought after in the job market and in graduate programs. See the requirements in this document.**

**Other Requirements**

**Students must take at least six of the courses for the major from CU Denver faculty, including at least three courses from the following list: ECON 3801, ECON 4071, ECON 4081, ECON 4811. Once a student has enrolled at CU Denver, no more courses in the major may be taken outside the CU Denver Economics Department. This includes courses offered at Metropolitan State College. The department reserves the right to require a demonstration of competence for any core courses not taken from CU Denver faculty.**

**GRADUATION CERTIFICATION CHECK-OFF SHEET**

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **CREDIT GRADE\* PTS.**

 **HOURS**

**2012 3 \_\_\_\_\_ \_\_\_\_\_ NOTES:**

**2022 3 \_\_\_\_\_ \_\_\_\_\_**

**3801 3 \_\_\_\_\_ \_\_\_\_\_ prerequisite for 4071**

**3811 4 \_\_\_\_\_ \_\_\_\_\_ prerequisite for 4811**

**4071\* 3 \_\_\_\_\_ \_\_\_\_\_ see prerequisite information**

**4081\* 3 \_\_\_\_\_ \_\_\_\_\_ see prerequisite information**

**4811 3 \_\_\_\_\_ \_\_\_\_\_ must take 3811 before 4811**

 **22**

**ELECTIVES**

**1 3 \_\_\_\_\_ \_\_\_\_\_**

**2 3 \_\_\_\_\_ \_\_\_\_\_**

**3 3 \_\_\_\_\_ \_\_\_\_\_**

**4 3 \_\_\_\_\_ \_\_\_\_\_**

**5 3 \_\_\_\_\_ \_\_\_\_\_**

**6 3 \_\_\_\_\_ \_\_\_\_\_**

**TOTAL 40 \_\_\_\_\_ GPA \_\_\_\_\_\_\_\_\_(2.5 min)**

**The general advice is to complete the required courses *as soon as possible* with perhaps one 3000 elective as well. Econ 3100 is a common elective because it counts as toward the major and satisfies the CLAS diversity requirement. Remember, however, that only two 3000 level courses count toward the major.**

**\*MUST SUCCESSFULLY COMPLETE ECON 3801 OR CALC II BEFORE TAKING ECON 4071 OR 4081.**

 **Next are the requirements for a dual degree in Economics and Mathematics which is very highly recommended for career success.**

**Degree Requirements for Dual Degree in Economics (BA) and Mathematics (BS) (Important note: see catalog for the official list of requirements)**

1. **No pass/fail grades can count toward the dual degree.**
2. **The minimum grade for all Economics courses taken at CU Denver and applied toward the major is C- (one D- is allowed for one Economics elective).**
3. **A minimum GPA of 2.5 is required for all ECON courses. Note: Only courses taken at CU Denver will apply in this calculation.**
4. **The minimum grade for all Mathematics courses taken at CU Denver and applied toward the major is C-.**
5. **A minimum GPA of 2.25 is required for all CU Denver Mathematics classes applied to the major.**
6. **In addition to the CLAS residence requirements, the Economics Department requires that all courses other than ECON 2012 and 2022 require written Departmental permission to be transferred in as satisfying major requirements.**
7. **In addition, the Mathematics Department requires that at least 15 upper division Mathematics credits must be taken at CU Denver.**
8. **The Mathematics Department requires that in the semester of graduation, students must submit a portfolio consisting of two papers, typically written in previous courses, that demonstrate Mathematical and writing proficiency; participate in an exit interview, which may be scheduled by the department administrative assistant; and complete a senior survey, available from the department administrative assistant.**

**>Take *all* of the following required Economics courses**

 **ECON 2012, 2022, 4071, 4081 and 4811.**

**>Take *all* of the following required Mathematics courses: MATH 1401, 2411,**

 **2421, 3000, 3191, 3200, 4310, 4779 and 3382 (or 4820).**

**>Take six Economics elective courses or five Economics courses (four**

 **at the 4000-level) plus one Mathematics elective course:**

* **Any six three-semester credit hour courses (four of them must be 4000-level) taken in Economics will satisfy this requirement, other than internships and independent studies. *Note:* ECON 3801 and ECON 3811 cannot be counted as electives**
* **One of the following Mathematics courses can be counted as *one* (but only one) Economics elective (it may also be counted as *one* Mathematics elective):**
* **MATH 3301—Introduction to Optimization in Operations Research**
* **MATH 3302—Simulation in Operations Research**
* **MATH 4387—Applied Regression Analysis**
* **MATH 4390—Game Theory**
* **MATH 4450—Complex Variables**
* **MATH 4733—Partial Differential Equations**
* **MATH 4810—Probability**
* **MATH 4650—Numerical Analysis**
* **MATH5350—Mathematical Theory of Interest**

**>Take four Mathematics elective courses or three Mathematics elective**

**courses plus one elective Economics course:**

* **Students must choose four approved Mathematics electives (of at least three semester hours each) above 3000, excluding MATH 3800, 4012, 4013, 4014, 4015 and 4830 *or***
* **One of the following Economics courses can be counted as one (but only one) Mathematics elective (and can also be counted as one Economics elective):**
* **ECON 4030—Data Analysis with SAS**
* **ECON 4110—Money and Banking**
* **ECON 4150—Economic Forecasting**
* **ECON 4320—Financial Economics**
* **ECON 4430—Economic Growth**
* **ECON 4550—Game Theory and Economic Applications**
* **ECON 4610—Labor Economics**
* **ECON 4740—Industrial Organization**

**SUGGESTED MATH COURSES FOR GRADUATE PROGRAMS**

**Top Masters programs in Economics and Finance are analytically very intensive. Careers as analysts, data mining, quantitative finance and risk management require advanced analytical and programming training. These careers are in high demand.**

**A minor is the absolute minimum that you should undertake if you want career success. Here are some courses that should be strongly consider (see your Adviser for program specific recommendations)**

***Math 1401 Calculus I***

***Math 2411 Calculus II***

***Math 2421 Calculus III***

***Math 3000 Introduction to Abstract Mathematics***

***Math 3191 Applied Linear Algebra (Do not take Math3195)***

***Math 3200 Elementary Differential Equations***

***Math 3382 Statistical Theory (students who take Math 4810 before***

 ***3382 do better in 3382)***

***Math 4310 Introduction to Real Analysis I***

***Math 4320 Introduction to Real Analysis II***

***Math 4650 Numerical Analysis I\****

***Math 4733 Partial Differential Equations***

***Math 4810 Probability Theory (Do not take Math3800)***

**Other Courses (*Check Prerequisites*) That Are Recommended:**

***Math 4390 Game Theory (Note Prerequisites)***

***Math 4201 Topology***

***Math 4450 Complex Variables***

***Math 4660 Numerical Analysis II\****

***Math 4792 Probabilistic Modeling\****

 ***\*particularly useful in computational finance***

**Next find advice from former students who have gone on to considerable career success. Notice the emphasis on data analysis and programming. SAS, Python, R, C++, Java, and SQL add up to careers. Get on it!!!**

**Advice from former students**

**Student 1:**

**Thanks for asking me for input, well, I think taking more computer science classes and have a strong math background will be very helpful. The ability to code in computer science language will never hurt you, so I would say pick it up as soon as one can.**

**Student 2:**

**I do have a few comments regarding the course selection and grad schools based on my own experience. Hope it will help.

1) Course Selection

I would suggest the undergraduate to select courses broadly and do not be scared away by the courses that you do not like or excel at.
Take myself as an example, back to a few years ago as an economics major student, I was so glad to have the opportunity to choose courses from a long list including economics, mathematics, finance, accounting, philosophy, communication, etc. It was not until I had worked in the real business world that I understood how important those course were. For example, I found accounting essentials could provide a solid foundation for your job regardless working as an analyst for banks, investment firms, fund companies, or starting your business. Also, strong mathematics, statistics or CS background could make you a competitive candidate for a fund or risk analyst position. Communication skills are very necessary especially for international students looking for a front desk or client related opportunity.
What's more important, no matter what you will be doing going forward, you’d better always be aware of the U.S. and global policies, which shows the importance of understanding macro-economics and international finance/trade. For instance, for fund managers, Fed policy plays a vital role in their decision making process. They take prompt actions with regards to the real-time information and predictions on the timing of Fed policy changes. For business owners, policy changes such as QE could have a significant effect on their businesses in terms of financing cost, international trade, business environment, etc. In fact, this is something related to every household when making decisions such as buying a house.

2) Graduate School

Getting into a grad school immediately after getting your bachelor degree might not be the best choice. If I get a second chance, I might try to hunt an internship or job first before applying for an advanced degree. Why? On the one hand, you could have a better understanding of what you really love and what your expertise is; on the other hand, you would have a better chance to be admitted by your dream school and study or do projects with more talents like you.
However, I am not regretting the decision I made two years ago regarding pursuing a master degree. Just keep in mind, no matter when and where you go to the grad school, you’d better try to set up your goal, work hard, reach out more people and be nice to others. Networking is extremely important, since it not only let you make more friends but also keep you posted with ongoing information. You never know.**

**Student 3:**

**"Here you will meet the most helpful professors, teaching assistants and academic advisers who show you how to learn and where to look. Here you will master the most lethal weapon, not only professional knowledge, but the ability to learn. Here is the university that helps you in whatever way to make your dream come true. Perhaps the roots of education are bitter, but believe me, the fruit is sweet. Best wishes for all ICB students."**

**Student 4:**

 **What I wish someone had advised me, though admittedly they might have done had I known to ask, is to do lots of projects outside of class. Grades are important, but what I ran into later on was "Great, grades! Now what else have you done?" Employers are focused on experience. They want to see that you can do something, not just test well. They want to see that you understand the material.

Don't worry about doing groundbreaking analysis. Just explore the material from your classes. Put your projects up on a blog, keeping in mind that it might get read by a future employer at some point. Realize that most of the world hasn't gone beyond Intro to micro/macro econ, and might be surprised and intrigued to find there is more to economics than they learned as freshmen.

When you have questions, and these side projects will hopefully fill you with them, ask a professor. You'll learn many times as much from a directed question than you learned from the lecture, and engaging with the professors outside of class could lead to more interesting projects!

Furthermore, lose your fear of math as soon as possible! Math is not merely calculation, it is a language. Don't leave it for later. While you can't apply much economic knowledge to math problems, you will constantly apply mathematical knowledge to economic problems. If you understand the language of math before you explore economics in depth, the material will make more immediate sense and you will end up with a much deeper understanding. If you spend half the class struggling with the math, you aren't learning the economics!

Don't get discouraged by those first few math classes either. Calculus 1 and 2 were the most difficult classes I came across on my way to a degree in math. They are perversely designed to "weed out" some portion of students. Once you make it through those two, you're home free.

Lastly, realize that your degree -that piece of paper- is only one line of your resume -another piece of paper- that will only get you as far as the interview stage. From there, you must impress with knowledge, experience, and social skill. Be sure that the degree you work so hard for is not just a piece of paper. Make sure it represents a body of knowledge that you are poised to expertly wield for the right price or the right cause.**

**Student 5:**

**I graduated May 2013 from UCD with a B.A in Economics and a B.S. in Mathematics with an emphasis in Statistics. It took me close to 4 months to find a job, and in fact, I accepted the first job offer I received.

Going into the job search after graduation, I felt like I was a strong candidate. The school had prepared me wonderfully in terms of general knowledge. I was encouraged to take a wide variety of classes, even outside of my own discipline. In fact, thanks to the advice from my advisor (Professor Smith) during my freshman year, I started to enroll in more mathematics courses, which then spiraled into me double majoring in Economics and Math. I cannot stress enough how much this push towards mathematics helped me become a more well-rounded candidate while job-seeking. It not only forced me to see economics in a more different light, but it also exposed me to the world of programming languages.

Something that I had not realized when I first started my undergraduate career was how heavily influenced by computers and computer programs the current job market was. Basically any job out there that I was interested in required some knowledge of a computer program – SAS, Java, Python, R, C++, SQL being the most popular ones. So I am thankful that this was pushed on me when I started taking more math courses.

Furthermore, they encouraged me to seek out internships. I was able to become a Market Research Analyst intern at a Fortune 500 technology company for an entire year, which I believe really helped me land a job, and I highly encourage everyone to seek PAID internships.

The economics department also did a wonderful job of instilling a mindset of research and of finding the answers to issues, either by reading a journal article or asking someone for help. This also helped me become a more well-rounded job candidate.

Sadly the job search goes beyond what is learned in the department. When I graduated I felt like a strong candidate, and I certainly do believe I objectively was one. However, there was a definite disconnect between my actual skills and what I was portraying during my job search. This is not the department’s fault, mainly I just hadn’t realized what it actually entailed to find a professional job as a recent graduate.

People mention that networking is everything, and I was very willing to believe them, but as a young person in her early 20s, my professional circle was insufficient for me to leverage it and find a job from it. This was certainly one of the most crushing aspects of my job search – I kept being told by my well-intentioned older peers, as well as by articles online, that networking was THE key to finding a job, but mine was insufficient! I feel like this will be a reality for most other graduates, and I want them to know that it’s perfectly okay to not be able to network your way into a job after graduation even if the job search is locally done in Denver.

One of the advantages of a local job search, though, is that it’s quite easy to pick an area where you wish to find employment (Downtown, Denver Tech Center, Boulder, etc) and to walk around the area looking for possible businesses. Most buildings will have a directory out front with names of the companies within it, so a person can easily make a list of less known firms that are local and that might have open opportunities. This also allows for people to drop off their resumes on any given day. This is a good alternative for local job candidates with a small network or who find job fairs not entirely useful (like myself).

Luckily, the job market is much stronger now than it was just a few years ago. I started college during the height of the recession (2008) so it instilled in me a deep, deep fear of being unemployed after finishing my schooling, which also affected what classes I took during school (“Is this class marketable in the job market?”) as well as it added an extra layer of stress to everything I did. So I want you to know that you shouldn’t follow in my footsteps. The local job market IS strong, and there are plenty of jobs out there if you just have patience and learn how to translate your current skills into a resume and cover letter.

On a related note, it might feel tempting to start applying for jobs, especially if locally, during your senior year of college. This might be a great if you are a pro at resumes and cover letters and are genuinely at the top of your graduating class. But otherwise, I would advise against it. Spending half of your time looking for and applying for jobs takes away from time that you could have spent on your coursework or on generally enjoying yourselves. Plus, it adds a whole new level of stress that is not necessarily what you want during your last few months of your academic life. From personal experience, I feel like I could have enjoyed myself and appreciated economics much more if I hadn’t been so stressed trying to find a job.

My final thought on the job search is that you should try to not become too focused on trying to find the perfect entry level job. You want your first professional job to be a stepping stone to your future career. In fact, in your first job, you'll realize how little you actually know about the professional world, regardless of how well you did in school. And this is quite alright.

The overall moral of everything I’ve written is as follows: Trust your econ advisers, they know what they’re doing. Take as many classes as you can in as many subjects as possible, but do try to build a strong background in mathematics and programming. Leverage your skills as best as you can, and if you don’t know how, ask for help. Enjoy yourselves, finding a job WILL suck and it will take you months, but the job market in Denver is strong. You know less than you think you do.**

**Student 6: (First worked as a consultant and then started own business.)**

**Importance of communication skills

Even the best analysis is useless if it isn’t properly communicated to the intended audience. Strong writing skills are so valuable and always worth developing. Verbal communication is also quite important. Actively seek out training and experience in both written and verbal communication. When you are seeing, hearing or reading a particularly good presentation, ask yourself what you think are the elements that make it good. Do the same for poor presentations, asking yourself to identify the elements that contribute to the poor quality. You may want to check out Edward Tufte’s work regarding the presentation of quantitative material. Most of our staff has been to his training seminars.

Regarding verbal communication, keep in mind that there are various forms of verbal communication, and you may be strong in one type and not so strong in another. Are you better at thinking out your presentation ahead of time, thinking on the fly, or both? Some kinds of presentations allow preparation time. For example, a planned presentation at a meeting, or to a legislative committee. Other kinds of presentations are on the spot, such as a roundtable discussion or when you get a phone call from an external organization. Keep in mind that in some formal presentations, you can control the presentation and question and answer part, whereas in other presentations, the audience can and will interrupt and take the discussion on a tangent. Learn how to diplomatically handle heated discussions. Develop leadership qualities. Sometimes, the interruptions are not appropriate, and it is appropriate for you to take back control of the discussion. Other times, the interruptions are appropriate and part of the process, and it is your job to make the best presentation possible given the situation.

Your path finding you

I interned at a consulting firm, and before I left, I interviewed each of the principal consultants about their work and career. Each of the consultants was an expert in a certain area of economics, with many years of experience. They were all quite respected and seemed to have great satisfaction in their work. Hearing their individual stories, I found it so interesting that, without exception, none of them planned or even expected to end up in their respective fields of expertise. In each case, it was a series of circumstances that led to the position that they developed a career around. Now, several years out of school, I am finding that this is turning out to be the pattern that my career is taking. So, don’t get too hung up about the specifics about the work you plan to do. I feel it is more important to develop your skills and knowledge, and to trust your instincts. Be ready to accept the opportunities that arrive to lead you to your career path and to take a chance or make a change if needed.

Pick up forecasting and econometrics courses

There are so many areas and applications where it is useful to have knowledge of forecasting and econometrics. I’d highly recommend picking up these courses at both the undergraduate and graduate level. Applied courses, like data analysis with SAS, for example, are also very, very useful.

Creating a bridge between research analytics and organizational operations

An operations unit within your organization asks for some economic research, which you provide, elegant and academically sound. But, they don’t know what to do with the information. Then what? It’s important to create a bridge between the analytical work and how the information may be utilized within the organization. The opportunities for you to develop this ability will likely be later, after school. This is something that is easy to overlook, though. It’s so easy for different areas of agencies to have difficulty collaborating because of the different nature and culture of the work. So, the ability to bridge the gap is very valuable and can be a way to get recognition within the organization, which can open doors for future projects and positions for yourself and for your peers. (It is also often an important role on advising people how not to utilize data or analytical information.)

Other remarks

Many jobs will provide training and grooming. In my experience, strong managers of a team of economists will utilize their staff in ways that leverage the strengths of individuals toward the group goals while also providing avenues for development.

The primary software tools I use on the job are Microsoft Word and Excel, SAS and EViews.

The decision of whether or not to continue to an MA, MS or PhD program is personal. You’ll have to gauge where you want to land, and seek the appropriate level of education. In my case, the MA in Economics at UCD was ideal because of the quality and applied nature of program. My position required an MA (or a number of years of experience). It’s possible to be overqualified for the position you actually really want, so more isn’t always better. But, for my work and that of most of my peers, the Masters degree is important.

Studying economics gives you a valuable way to approach analysis. I’m continually surprised at how useful it is for such a wide variety of questions and applications. People respect good economic analysis, and may even think it’s kind of “voodoo” – they respect it, but it’s confusing to them. (I’d argue that’s where clear communication comes in to help make the information as straightforward and useful as possible.) At any rate, as well as being valuable for jobs that are formally geared toward economic analysis, it is also an important compliment to many other jobs.**

**Student 7:**

**For student who is going to apply for Accounting in graduate school, I would recommend them to do research on the potential career for accountants first. And they have to know what they want to do when they graduate. Because there are lots of choices for accountants, whether to work in a specific industry or to be a public accountant. I suggest students go to career services / career fair and talk to recruiters to get an insight into accounting.

And there are a lot exams and certificates in accounting, I would suggest them figuring out which certificates (CPA, CMA, CIA, etc.) they want to get, and prepare for the exam early.

One thing I heard is that more graduate schools are offering accounting programs than ever, which is good for the students. And many companies are expecting their managers/CFO to have accounting background.**

**Honors in Economics**

Students wishing to earn departmental honors in Economics should consult with their advisor no later than the beginning of their senior year.

Cum Laude will be granted to students who complete an Economics major with a 3.50 GPA in all upper division (3000+) courses in economics taken at CU-Denver with a minimum of 8 such courses, and either: two additional electives in economics beyond those required for the major, taken at the 4000 or higher level, or an acceptable honors thesis. The thesis must be approved by a three-member committee of the department faculty and will include a presentation of the results to that committee. Students should register for the thesis, using ECON 4850\* as the course number, as a three-credit independent study, which will be in addition to the regular requirements for the major. Students must use a “Special Processing Form” to register.

Magna Cum Laude will be awarded to students who complete an Economics major with a 3.70 GPA in all upper division (3000+) courses in economics taken at CU-Denver with a minimum of 8 courses, and complete an acceptable honors thesis. The thesis must be approved by a three-member committee of the department faculty and will include a presentation of the results to that committee.  Students should register for the thesis, using ECON 4850\* as the course number, as a three-credit independent study, which will be in addition to the regular requirements for the major.  Students must use a “Special Processing Form” to register.

Summa Cum Laude will be awarded to students who complete an Economics major with a 3.88 GPA in all upper division (3000+) courses in economics taken at CU-Denver with a minimum of 8 courses, and completion of an outstanding honors thesis. The thesis must be approved by a three-member committee of the department faculty and will include a presentation of the results to that committee.  Students should register for the thesis, using ECON 4850\* as the course number, as a three-credit independent study, which will be in addition to the regular requirements for the major.  Students must use a “Special Processing Form” to register.

In order to wear the “Honors” cord at the spring graduation ceremony, a draft of the thesis must be submitted to the chair of the committee by the Monday following spring break, all other requirements including oral presentation and proof of meeting the GPA requirements must be completed by the week before graduation.

In order to be recognized in the spring graduation program, as “Honors Pending,” a draft of the thesis must be submitted to the chair of the committee by the Monday following spring break, the oral presentation and other requirements must be completed one week before graduation.

In order to be recognized in the spring graduation program with the specific honors degree being conferred, e.g. “summa,” “magna,” etc. students must turn in the completed final copy of the honors thesis by the Monday after spring break in addition to meeting the other requirements by the week before graduation.

Unless the above conditions are met according to the deadlines, recognition will come with the diploma after graduation.

\*It is very important to note that a student choosing to do an honors thesis ***cannot*** use ECON 4850 as an elective toward fulfilling the Economics requirements for a degree. In short, the honors thesis counts only for honors but does not replace any elective or core Economics requirements. A student must still fulfill all of the required and elective courses listed on the first page of this document.