THE BAY AREA'S MASTER'S PROGRAMS IN ECONOMICS

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1. OPTIONS

This is an overview of standalone ("terminal") master's programs in economics in the Bay Area and regions that lie immediately beyond it. There are six:

- California State University, East Bay
- Sacramento State University
- San Francisco State University
- San Jose State University
- University of California, Santa Cruz
- University of San Francisco.

The first four are part of the California State University system. The University of San Francisco is a private (historically Catholic) institution. These award the MA (Master of Arts) agree. USF also offers an MS (Master of Science) in International and Development Economics that requires field research abroad and is focused on placement in international organizations, hence is not a close substitute for traditional master's programs in economics. (To add to the confusion, the MS is less analytically oriented than the same university's MA.) UC Santa Cruz is the only Bay Area university that offers both the PhD in economics and a separate master' program, the MS in Applied Economics and Finance. (Stanford, UC Berkeley, UC Davis, and UC Merced do not offer admission for the purpose of getting a master's).

1.1. Difference from Master's en route to a PhD

There are important differences between terminal master's degrees and master's degrees earned in the course of PhD studies. A terminal master's program tends to be more applied, designed to be an accessible entry into higher-level economics without presuming advanced mathematical preparation, and relevant to the local job market. On the other hand, the coursework phase of a PhD program, which also leads to a master's degree in most programs, is entirely focused on setting up the doctoral thesis. Because primary literature in economics uses a highly technical language, PhD courses aim to bring students up to the required level of mathematical sophistication. Applied skills typically play no role, and students with insufficient mathematics background are either not admitted or at great risk of failing out of the program within a year or two.

As a result of these divergent objectives, terminal master's programs are in a distinct market from PhD programs. Most universities that offer the economics PhD do not simultaneously offer a terminal master's.

1.2. Difference from Related Degrees

The master's in economics is one of two major applied analytical degrees – concerned with methodological training for problem-solving in business and administration – that are commonly awarded. An economics program focuses on both econometric data analysis and competitive and strategic reasoning, grounded in theory and modeling and optimization skills. Such capabilities are particularly relevant for jobs in corporate finance, marketing research, and consulting (and, of course, academia if one continues on to the PhD).

The closest relative would be the master's in statistics, which is entirely about empirics without the behavioral foundations that shape how an economist interprets evidence and formulates research questions. Pure statistical knowledge can be applied to risk analysis for insurance and actuarial services, and experimental design for quality control and product development (for example, in the pharmaceutical industry). Statistics programs also tend to emphasize computation, which makes their graduates strong candidates for careers in data science (more on this in a moment).

Economists rely in their capacity as analysts on information, which comes increasingly from highly detailed sales data (thanks to modern technology, such as checkout scanners). Business loves to create buzzwords for this kind of thing, and so we are now in the era of "big data," data so plentiful and of such high quality that companies need to invest considerable resources in the process of collecting, housing, retrieving, and understanding them. The people who do these things need an advanced background in database administration, related programming languages, and graphing ("visualization")

software. They are called data scientists. Statistical and computer science programs now get increasing competition from business schools in this area, namely from the data (or business) analytics degrees. Economics master's programs typically do not teach such specialized programming and data management skills, but economists are experts at using data to perform causal analysis, identify relationships, and make sound forecasts, rather than simply represent data (known as "data mining"). Data analytics programs can therefore be thought of as training the data technicians who supply information to experts at research and decision making.

The master's of business administration (MBA), and its public-sector cousin the master's of public administration (MPA), provide exposure to the various functions and aspects of a business or public organization for careers in general administration. MBA's aren't experts at anything in particular, but they should know enough to work with analysts and other specialists and use their insights and advice to advantage. Economists have skills that are very valuable in management roles, such as a precise understanding of strategic competition and incentives. However, they also lack some specific background (say, accounting or legal) they would have to acquire in order to succeed in an executive career. (Many senior executives are, in fact, economists by training.)

One major difference between MBA programs and master's programs in economics is that only the former require significant work experience (in part to guarantee a respectable placement at the end). Prior work experience is not viewed as essential in economics, because the focus is on methodology that is based on logic, rather than established "best practices" which must be studied in context. Master's programs in health care administration, say, or tourism and recreation, are basically MBAs for unique industries, and economists are qualified to compete with their graduates for jobs in these industries, but lack of course some of the specific knowledge.

1.3. Some Basic Descriptors

Four of the six departments are in the Bay Area proper; Santa Cruz and especially Sacramento are a considerable distance, more than fifty miles, from San Francisco. East Bay is the only campus (among all universities and colleges) within 25 miles of both downtown San Francisco and Google (as a marker for Silicon Valley).

University	Economics Department		Campus Distances*	
	Administrative Home	Ten. / TT Faculty **	San Francisco	Google HQ
California State University, East Bay	Business	7	21.9	17.6
Sacramento State University	Social Sciences	16	76.0	87.5
San Francisco State University	Business	11	5.3	30.9
San Jose State University	Social Sciences	10	42.5	11.9
University of California, Santa Cruz	Social Sciences	20	58.9	29.6
University of San Francisco	Arts & Sciences	8	1.5	32.1

Notes: * Linear distance in miles, center-to-center between zip codes (94102 for SF, 94043 for Google).
** Excludes lecturers, adjuncts, and emeriti.

Santa Cruz and Sacramento State have, by far, the most faculty. (The tenured and tenure-track professors counted here are the ones most likely to teach in a graduate program, although departments may also make use of professional economists working in the Bay Area. Generally, these professionals would have to be PhDs to teach a graduated course.) East Bay and San Francisco State are housed in a business school, which often indicates a stronger orientation towards topics like competition, innovation, and demand analysis, rather than public policy, development, or welfare analysis.

Programs comprise between ten and eleven courses, with varying core and elective components (details appear below). The equivalent of one course usually accrues to a research activity, which can take the form of a project class or a master's thesis.

University	Program Schedule			Program Length	
	Fall-Entry only	One-Year Option	Part-Time Option	Number Courses*	Number Electives
California State University, East Bay	N	Y	Y	11	5
Sacramento State University	N	N	Y	10	3
San Francisco State University	Y	N	**	10	4
San Jose State University	N	Y	Y	10	5
University of California, Santa Cruz	Y	Y	N	11	2
University of San Francisco	Y	N	Y	11	6

Notes: * Includes master's theses, where they carry course credit.
** The program admits part-time students, but some courses may have to be taken during daytime.

There are a few trade-offs that impinge on departments' scheduling choices. 1) Between a more tightly structured curriculum, where courses build linearly on each other, and flexible entry at various points in the academic year. Half the program opt to restrict admission to the fall term, the other half accommodates new enrollments throughout the year. 2) Offering eleven graduate economics per year, so that the program can be completed in minimal time, is a stretch for most departments that can only be managed with sufficiently strong enrollments. Many departments are forced to allow students to

take classes at the undergraduate level ("cross-listed") or outside economics in order to have a one-year program. Or make it a two-year program. 3) In a premium job market like the Bay Area, some students understandably want to complete the degree while continuing to work and earn an income. Most programs therefore try to offer graduate classes after-hours on a single day of the week (in three-hour time blocks). However, these preferences tend to conflict with those of full-time undergraduate students, and to the extent that a department cross-lists electives, its program will not be fully compatible with part-time study.

2. PROGRAM STRUCTURE

Each program has a core that covers micro- and macroeconomic theory, and typically econometrics and mathematics for economists. The remainder is mostly electives, ideally from a set of dedicated graduate classes (but more often a combination of these and cross-listed undergraduate, or approved business and similar, courses). Most programs also incorporate some kind of research experience and / or a comprehensive exam. Both come in many varieties; in particular, comprehensive exams are not necessarily traditional memorization affairs as they would be in a PhD program.

2.1. Cal State East Bay

East Bay's program is the only one that has no mathematics class in the core. Instead, there are two microeconomics courses, where every other program only has one in the core. Two econometrics classes are required. A comprehensive exam is required of all students. It tests whether students are able to apply economic reasoning and analysis to realistic, non-textbook decision scenarios.

California State University, East Bay http://www20.csueastbay.edu/cbe/departments/economics/Graduate-Program.html				
Required		Elective	Research	Exam
Microeconomic Theory I *Microeconomic Theory II* *Macroeconomic Theory* *Econometrics* *Advanced Applied Econometrics*		All electives are graduate-level classes	*Res. Methods* OR Thesis	Yes
Courses	5	+ 5	+ 1	= 11
Units	20	+ 20	+ 5	= 45

Compared to other programs, many of East Bay's regular electives focus on business and competition (Corporate Governance & Entrepreneurship; Economics of Innovation & Intellectual Property; Industrial Organization & Public Policy) and analytics (Market Design; Project Analysis). These are complemented by International Economic Development; Labor Economics; Monetary Theory; Public Sector Economics; Urban & Regional Economics.

At East Bay, graduate economics courses are never cross-listed as undergraduate courses, and undergraduate courses cannot be taken for graduate credit. One substitution of an approved non-economics graduate course for an economics elective, in a career-relevant area like IT, marketing, or mathematics, is granted, and taking additional courses outside the program is encouraged. Graduate classes at East Bay are taught in the evening (6.00 pm to 8.50 pm or 6.30 pm to 9.20 pm) in order to accommodate part-time students. Enough graduate courses are offered every year to allow a full-time student to complete the degree within one year.

2.2. Sacramento State

Sacramento State's program has one of the largest cores, comprising six classes, including three econometrics courses. It is moreover unique in being the only program where every student writes a master's thesis.

Sacramento State University http://catalog.csus.edu/current/programs/econ.html#Graduate				
Required		Elective	Research	Exam
Mathematics for Economists *Advanced Microeconomic Theory* *Advanced Macroeconomic Theory* *Introduction to Econometrics* *Applied Econometric Analysis* *Advanced Applied Economics*		All electives are graduate-level classes	Thesis	No
Courses	6	+ 3	+ 1	= 10
Units	18	+ 9	+ 3	= 30

As the university of the state capital, Sacramento State prepares students in particular for placement in government, and this is reflected in a predominance of policy-oriented electives (Cost Benefit Analysis; Food Economics; Monetary and Fiscal Policy; Public Finance; Urban Problems, Economics and Public Policy), complemented by Industrial Organization and Performance; International Trade. Substitutions of courses from other departments are not specifically permitted.

The Sacramento State graduate economics courses are graduate-only and taught in the evening (5.30 pm to 8.20 pm) to accommodate part-time students. The schedule is designed for completion in two years.

2.3. San Francisco State

San Francisco State has a similar core to Sacramento State's: six required classes, half of which are theory and mathematics and half empirical analysis. However, there is no thesis option. Instead, students write a referee report under exam conditions, on a journal article the department chooses from a set that is pre-assigned for reading.

San Francisco State University http://cob6.sfsu.edu/economics/graduate				
Required		Elective	Research	Exam
Mathematical Economics *Microeconomic Theory* *Macroeconomic Theory* *Data Research Methods* *Introduction to Econometrics* *Adv. Econometric Methods & Applications*		Most electives are paired with undergraduate classes	None	Yes
Courses	6	+ 4	+ 0	= 10
Units	18	+ 12	+ 0	= 30

San Francisco State's economics department teaches very few dedicated graduate electives (there is just a Graduate Seminar in Applied Economics, which is essentially the seventh core class, since students must take one graduate-only elective). Typically, students take three of the four electives from a set of cross-listed undergraduate / graduate courses (Applied Microeconomics; Economics of the Environment; Health Economics Analysis and Research; Industrial Organization; International Finance and Macroeconomics; International Trade Theory and Policy; Public Economics; Theory of Economic Development). Two electives may, however, be taken outside the department, from a number of business, international relations, and mathematics classes that are pre-approved for substitution.

Some classes are scheduled in the evening for the benefit of part-time students, but because most electives double as undergraduate courses, they often take place in the daytime. Even full-time students are generally expected to take two years to finish the program.

2.4. San Jose State

San Jose State's core contains five classes, with much less econometrics than other programs (one course, Economic Methods, that is only partially about empirical techniques), but including a unique Workshop in Policy Analysis. One of the required classes, Mathematical Methods for Economics, is actually an undergraduate course, which carries four units. There is a choice between two alternative macro courses. In addition, students decide whether to write a thesis or, instead, take an additional elective and a traditional comprehensive exam (covering problems in micro and macro, and policy-related questions).

San Jose State University http://www.sjsu.edu/economics/graduate_students/ma_econ/				
Required		Elective	Research	Exam
Mathematical Methods for Economics *Microeconomic Analysis* *Macroeconomic Analysis* (OR *Monetary Theory and Policy*) *Economic Research Methods* *Workshop in Policy Analysis*		Graduate-level electives are available, but can be replaced	Additional Elective + Exam OR Thesis	Opt.
Courses	5	+ 4	+ 1	= 10
Units	16	+ 12	+ 4	= 32

Students have an opportunity to take some more methodological classes as electives (Econometric Methods; Mathematical Economics). Like the core and the comprehensive exam, the graduate electives reflect an emphasis on policy-oriented topics (Quantitative Economic Analysis for Public Decision-Making; Public Finance; Public Law and Economics). Other electives span a variety of fields: Economic Development and Institutions; Industrial Organization; International Trade and Finance; Labor Economics; Managerial Economics. Students can declare a Concentration in Applied Economics if they take Public Finance and Industrial Organization. Graduate-level classes are offered in late afternoon or evening (5.00 pm to 6.15 pm or 6.30 pm to 9.50 pm).

Electives need not come from the above set, since the program allows students to substitute up to four undergraduate courses. In addition, up to two courses may be taken at graduate level in other departments. This is a lot more freedom than any other program provides. More than half of all units could come from classes that are not graduate-level economics. The San Jose State program can be finished within a year.

2.5. UC Santa Cruz

The MS at UC Santa Cruz is designed as a one-year professional degree with a rigid, intensive structure. It starts off with a preparatory math class, prior to the beginning of the fall quarter, that carries no units. There are seven five-unit core classes, covering economic theory (two courses) and econometrics (two courses), as well as applied economics (one course) and finance (two courses). In addition, a 4-unit lab (split up over the fall and winter quarters) gives students hands-on practice with data analytics.

Students are also required to attend a series of weekly talks in the winter and spring quarter. The Applied Economics Seminar counts as a 4-unit course overall. Finally, there is a comprehensive exam in applied economics and financial engineering, which can be replaced with a research project with the consent of the faculty.

University of California, Santa Cruz http://economics.ucsc.edu/academics/graduate-program/masters/				
Required		Elective	Research	Exam
(Mathematical Methods for Econ. Analysis) *Microeconomic Analysis* *Macroeconomic Analysis* *Applied Econometric Analysis I* *Applied Econometric Analysis II* *Applications Microeconomics* *Applied Economics Lab* *Finance* *Financial Engineering*		Eligible electives are drawn from other programs	*Applied Economics Seminar* + opt. Research Paper	Opt.
Courses	8	+ 2	+ 1	= 11
Units	39	+ 10	+ 4	= 53

There are no electives that are specifically designed for MS students. They can choose from a pre-approved list comprised of PhD field courses (Development Economics; Public Economics; Time Series) that require instructor permission, MBA classes, and undergraduate and postgraduate courses mainly from IT management, computer science, mathematics, and statistics. The program is to be completed full-time within a year; it cannot be taken part-time.

2.6. University of San Francisco

USF's program is marketed to undergraduate economics majors as a five-year BA/MA combination, and operates as an extension of the undergraduate program, but it also gets plenty of external applicants. It takes the honors for the smallest core in this

sample: micro, macro, and econometrics get one course each, in addition to mathematics for economists. However, there is a list of "foundational" courses that students are assumed to have taken already (and would complete in the course of their undergraduate career at USF). At the end, every student writes a research paper, to be presented in the required Graduate Research Seminar, or as an "honors" option a proper master's thesis with oral defense. In addition, students must pass a comprehensive exam, which covers micro and macro theory.

University of San Francisco http://www.usfca.edu/artsci/econg/				
Required		Elective	Research	Exam
Mathematics for Economists *Microeconomics: Theory and Applications* *Macroeconomics: Theory and Applications* *Graduate Econometrics*		Most electives are paired with undergraduate classes	*Graduate Research Seminar* + opt. Thesis	Yes
Courses	4	+ 6	+ 1	= 11
Units	12	+ 18	+ 3	= 33

USF cross-lists most of its upper-level undergraduate courses as graduate electives. Students commit to a Concentration in Financial Economics or International Economics, or work with an advisor to design a concentration for themselves. Those who specialized in Financial Economics take Monetary Economics and Money, Banking, and Financial Institutions. For International Economics, the six electives must include International Finance and International Trade. There are further related graduate-level course offerings that mainly support the specialized master's in development (Advanced Topics in Development Economics; Applied Econometrics for International and Development Economics). Advanced Applied Econometrics is another graduate-only elective

Courses can also be taken without restrictions from graduate mathematics or from the MBA program. Morever, one pure undergraduate course from either economics or mathematics may be used as an elective. USF schedules many of its classes that are eligible for graduate credit (including the cross-listed undergraduate courses) in the evening (6.30 pm to 9.15 pm). Therefore the program accommodates part-time students. It takes a minimum of two years to finish.

3. FEASIBILITY

Admission standards are difficult to gauge from public information (since it would be easy and "costless" for departments to flatter themselves). The minimum standards are fairly consistent across the board, and often permissive toward imperfect credentials. A few programs require, however, standardized tests and recommendation letters and have deadlines far in advance of entry, which require (perhaps intentionally) a good deal of planning of prospective applicants. Expense is determined, on the one hand, by the differences between costs of private and research universities (like USF and Santa Cruz) vs. the Cal State system and, on the other hand, by the possibility of finishing within one year vs. paying annual tuition twice. Santa Cruz is also the only program to add a "professional" surcharge (which is reserved for business programs at the Cal States).

3.1. Admission

All master's programs expect a GPA in the neighborhood of 3.0 or better. Some will make exceptions where warranted by other considerations (East Bay, San Francisco State, Santa Cruz, USF), others provide an alternative path to admission (San Jose State requires the GRE in those cases), and sometimes it's at least officially a hard rule (Sacramento State, where the GPA is calculated over the last 60 units attempted).

Intermediate micro- and macroeconomics, as well as some calculus and statistics, are normally considered minimum preparation for graduate courses, but – while desirable – these things are usually not firm requirements in master's admissions. In fact, most programs will admit suitable students and allow them to make up deficiencies at the undergraduate level before taking graduate courses. USF has the most comprehensive list of "foundational" courses in economics (micro- and macroeconomics as well as game theory) and mathematics (quantitative methods, Calculus I-II, and one upper-division undergraduate math course) that students should complete before enrolling in advanced classes. Most programs recommend, but unevenly enforce, these minus game theory and upper-level math.

The TOEFL or a similar proof of English proficiency (IELTS) is asked of all students who did not graduate from undergraduate institutions where English is the language of instruction. (Sufficient scores are usually 220 on the computer-based TOEFL and 7 on the IELTS.) Three programs require standardized test scores and also letters of recommendation: Sacramento State and San Francisco State (GRE and two letters), as well as Santa Cruz (GRE or GMAT, and three letters). As previously mentioned. San Jose State will ask for the GRE (but not letters) if an applicant's GPA (over the last 60 units) is below 3.0. East Bay and USF encourage applicants to submit their GRE scores if it strengthens their case for admission.

University	Admission Requirements		Admission Deadlines		
	GRE	Letters	Fall	Winter	Spring
California State University, East Bay	N	N	7/15	10/15	1/15
Sacramento State University	Y	Y	3/1	NA	-9/15
San Francisco State University	Y	Y	5/1	NA	NA
San Jose State University	Y**	N	3/1	NA	-10/1
University of California, Santa Cruz	Y***	Y	2/1	NA	NA
University of San Francisco	N	N	5/15*	NA	NA

Notes: - Deadline is in the year before the term of entry.
* Priority deadline is 3/1.
** GRE requirement is waived for those with a GPA of at least 3.0.
*** GMAT is also accepted in place of GRE.

Santa Cruz has the most demanding deadlines, accepting one intake per year, and requiring applications more than half a year prior. East Bay is the only program with three annual rounds of admission, and its deadlines are also the latest, occurring only about two months before the start of the term.

3.2. Cost of Attendance

The four members of the California State University system have similar costs, with annual base tuition and fees for graduate students around $8,000 and a fixed $372 per semester unit surcharge for non-residents (and international students, since they are treated as non-residents for tuition purposes). Of these, only East Bay is on a quarterly calendar (but switching to semesters in fall 2018). The quarter unit surcharge for non-residents is $248 in this case (two-thirds, reflecting that a quarter is 10 weeks to a semester's 15 weeks). UC Santa Cruz (which is also on quarters) applies a flat surcharge of $12,245 to non-residents on top of its annual resident graduate tuition of $11,220.

None of the Cal State programs incurs the surcharge that is applied to business programs on their campuses (it would otherwise add more than $7,500 to the cost of the degree). This is in spite of the fact that the economics departments at East Bay and San Francisco State are part of the respective business schools. On the other hand, UC Santa Cruz adds a professional fee of about $8,000 to its MS tuition. USF, as a private institution, does not distinguish between residents and non-residents, and charges about $1,200 per unit.

University	Type	Full Program Tuition & Fees			
		Resident		Non-Resid. / Int'l	
		1 Year	2 Years	1 Year	2 Years
California State University, East Bay	Public	7,830	15,660	18,990	26,820
Sacramento State University	Public	NA	15,828	NA	26,988
San Francisco State University	Public	NA	15,468	NA	26,628
San Jose State University	Public	8,589	17,178	20,493	29,082
University of California, Santa Cruz	Public	24,960	NA	37,205	NA
University of San Francisco	Private	NA	NA	NA	39,897

These numbers are from the academic year 2014-15 (in the case of San Jose State, the fall 2014 cost was not available and presumed equal to spring 2015). The calculations are based on full-time enrollment in each term. Typically, a full-time student can take two or more classes under a quarter system, i.e. six or more per year, and four or more under a semester system, i.e. eight or more per year. Since the programs have between ten and eleven courses, it is possible to finish in one or two years while studying full-time (provided the program accommodates a one-year completion).

Master's programs generally do not have scholarships (although students may qualify for need-based financial aid). Some of the Cal State programs occasionally give out small awards (usually about $1K) that become available through private donations. Only the University of San Francisco might grant substantial merit-based department scholarships of up to $15K to graduate students. These are rare and conditional on maintaining a high GPA while in the program. Santa Cruz offers no specific information, but mentions that some merit-based funding may be available to MS students from the department. (Since the degree carries a professional fee, scholarship aid is, as with MBA programs, probably not the norm.)