

**New Program Proposal  
 Master of Science in Economic Analytics  
 Clemson University**

**Summary**

Clemson University requests approval to offer a program leading to the Master of Science in Economic Analytics, to be implemented in the Fall of 2020 through traditional course delivery. The following chart outlines the stages of approval for the proposed program. The Advisory Committee on Academic Programs (ACAP) voted to recommend approval of the proposal. The full program proposal is attached.

<b>Stages of Consideration</b>	<b>Date</b>	<b>Comments</b>
Program Proposal Received	1/9/20	Not Applicable
Staff comments to the institution	2/25/20	Staff requested revisions to the program proposal to address questions about approvals, program uniqueness, and assessment of need.
Revised Program Proposal Received	2/27/20	The revised proposal satisfactorily addressed the requested revisions.
ACAP Consideration	6/9/20	<p>The Clemson University representative presented the proposed program, noting it would focus on preparing students to apply quantitative analysis and economic principles. The program can be completed within three semesters and is not designed for students who desire to pursue a terminal degree. The representative stated Clemson reaffirmed its commitment to the program given current pandemic conditions. In addition, the institution plans for the program to be supported through reallocated funds.</p> <p>The ACAP representative from Greenville Technical College asked if the proposed program would detract at all from other programs and whether the program would consider online classes. Clemson representatives noted that existing programs do not offer both theoretical economics and quantitative analysis. They further explained that some undergraduate students may become interested in this program as a graduate degree option, but they believe the program would attract mainly new students that would not be interested in other campus programs. They also stated that the uniqueness of this program is better suited for in-person classes, so they do not have plans to offer the program's classes through an online format.</p> <p>After remaining discussion, ACAP voted unanimously to recommend approval of the program proposal.</p>

**Recommendation**

The staff recommends that the Committee on Academic Affairs and Licensing favorably commend to the Commission the program leading to the Master of Science in Economic Analytics, to be implemented in the Fall of 2020.

**Clemson University Student and Program Data**

<b>Graduate In-/Out-of-State Enrollment, Fall 2018</b>	2,195 (41.56%) / 3,087 (58.44%)
<b>Number of Approved Programs in 10 Yrs. (FY 2010 - 2019)</b>	40
<b>Number of Terminated Programs in 10 Yrs. (FY 2010 - 2019)</b>	16

**Industry related Occupational Wages and Projections in South Carolina, 2016 – 2026\***

<b>Occupational Field<sup>1</sup></b>	<b>2016 Median Income<sup>2</sup></b>	<b>2016 Estimated Employment<sup>3</sup></b>	<b>2026 Projected Employment</b>	<b>Total 2016-2026 Employment Change</b>	<b>2016-2026 Annual Avg. Percent Change</b>	<b>Total Percent Change</b>
Life, Physical, and Social Science	\$57,550	10,547	11,445	898	0.82%	8.51%

<sup>1</sup> “Occupational Field” represents the closest related occupation category that includes the occupations aligned with the program proposal.

<sup>2</sup> SC Department of Employment & Workforce (DEW), Labor Market Information. (2019). Occupational Employment and Wage Rates (OES) for All Major Groups in South Carolina in 2016 [Data file]. Retrieved from <https://jobs.scworks.org/vosnet/lmi/default.aspx?pu=1>

<sup>3</sup> SC Department of Employment & Workforce (DEW), Labor Market Information. (2019). Occupational Projections (Long-term) for Multiple Occupations in South Carolina in 2016-2026 [Data file]. Retrieved from <https://jobs.scworks.org/vosnet/lmi/default.aspx?pu=1>

\* Data downloaded September 16, 2019; Most recent data available.

## NEW PROGRAM PROPOSAL FORM

Name of Institution: **Clemson University**

Name of Program (include degree designation and all concentrations, options, or tracks):  
**MS Economic Analytics**

Program Designation:

- |   |  |
|---|--|
| <input type="checkbox"/> Associate's Degree   | <input checked="" type="checkbox"/> Master's Degree                                  |
| <input type="checkbox"/> Bachelor's Degree: 4 Year  | <input type="checkbox"/> Specialist  |
| <input type="checkbox"/> Bachelor's Degree: 5 Year  | <input type="checkbox"/> Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA) |
| <input type="checkbox"/> Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.) |  |

Consider the program for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes  
 No

Proposed Date of Implementation: **August 2020**

CIP Code: **45.0603 (Econometrics and Quantitative Economics)**

Delivery Site(s): **50104 Clemson University (Main Campus)**

Delivery Mode:

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Traditional/face-to-face<br>*select if less than 25% online | <input type="checkbox"/> Distance Education                             |
|   | <input type="checkbox"/> 100% online                                    |
|   | <input type="checkbox"/> Blended/hybrid (50% or more online)            |
|   | <input type="checkbox"/> Blended/hybrid (25-49% online)                 |
|   | <input type="checkbox"/> Other distance education (explain if selected) |

Program Contact Information (name, title, telephone number, and email address):

**Prof. Molly Espey; Clemson University Dept of Economics; 864.656.6401; [mespey@clemson.edu](mailto:mespey@clemson.edu)**  
**Jeremy King; Assoc Provost for Institutional Effectiveness; 864.934.3554; [jking2@clemson.edu](mailto:jking2@clemson.edu)**

Institutional Approvals and Dates of Approval (include department through Provost/Chief Academic Officer, President, and Board of Trustees approval):

**Graduate Curriculum Committee: 13 December 2019**  
**Provost: 16 December 2019**  
**Clemson University Board of Trustees: 7 February 2020**

### **Background Information**

*State the nature and purpose of the proposed program, including target audience, centrality to institutional mission, and relation to the strategic plan.*

Recent dramatic improvements in computing power, software, and data availability have rapidly lowered barriers for talented individuals who want to study and understand at an advanced level how markets function, but who do not want to earn a PhD in Economics. The proposed MS Economic Analytics degree program allows students from a range of backgrounds to advance their quantitative analytical skills with specific application to improving economic decision-making. Students will take 6 credit hours of economic theory, 6 credit hours of economic analytics for business, 6 credits of data analytics for economics, 6 credits hours of elective courses in economics, and 6 credit hours of research culminating in a thesis.

We stress that the goal of the proposed program is focused squarely on *new* student enrollment streams to meet voracious market demand (see next section), and not on dividing up the current population of students served by our current programs. The MS Economic Analytics program seeks to serve *traditional populations of recent baccalaureate* students, including *international students enticed by USCIS-recognized STEM program CIP coding* enabling OPT extensions, in *traditional face-to-face modality* by offering strong *quantitative skills with a solid theoretical economics (not business or finance) background*:

- Our MA Economics degree is not a STEM-coded program and does not offer the quantitative skills training by the proposed program
- Our MS Data Science and Analytics program is offered exclusively online and aimed at non-traditional working professionals
- Our MS Applied Economics and Statistics degree is not a STEM-coded program
- Our MBA with Business Analytics program curriculum is not built upon a foundation of theoretical economics

Each of these four current programs serves an important purpose for an important student population—we do not expect that circumstance to change. The proposed MS Economic Analytics program alone, however, encapsulates all the four features highlighted above.

The MS Economic Analytics degree links to the College of Business' mission of "transforming students into leaders, innovators and entrepreneurs who succeed in the global marketplace of ideas." The program will give students practical experience in quantitative economic analysis and data analytics, producing market-ready graduates to support the growing demand for quantitatively trained economists. It also supports the University's ClemsonFORWARD goal of nationally recognized, high-level research and graduate programs, and represents an opportunity to increase economic development in the State by building on our existing strength in the economics of business and data analytics (e.g. our MS Data Science & Analytics degree program and the Business Analytics track/option in our MBA program).

American universities have struggled to meet the increasing demand by business for students with quantitative analytical skills. Economics, and economic analytics in particular, bridges social science, quantitative science, and technology to help businesses analyze markets and meet the demands of their end-user consumers. Clemson's historic strengths in technology and computing, combined with nationally recognized economics faculty, make it a natural home for an economic analytics program aimed at meeting this growing demand.

### **Assessment of Need**

*Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable.*

Over the last decade, advances in computing power, statistical software, and data availability have dramatically increased the opportunities for data scientists and industry analysts. Many data scientists are highly skilled at identifying correlations in data and then using the identified correlations for prediction. However, correlation is not causation. Professional economists use economic theory and analytics to explain the correlations and determine causation. In particular, economists think about the objectives that

consumers and companies have, the constraints they face, the markets in which they operate, and the choices they are likely to make given these objectives and constraints. The choices of consumers and firms to achieve their constrained objectives are drivers of the correlations that we observe.

The improvements in computing power, software, and data availability have lowered educational barriers for talented individuals who want to understand and develop sophisticated models of how markets function. In our opinion, there is a need for the economics profession to produce master's students who can seamlessly transition into careers in finance or business without a PhD. Moreover, the demand for well-trained economists with a master's degree is increasing. Forbes has included Economics in its Top 10 list of the "Best Master's Degrees for Jobs". According to Forbes, the mid-career median pay is \$115,000 for someone with a Master's in Economics, and the projected employment increase for jobs associated with this degree is 14.3 percent.

Our opinion and that of Forbes is backed, ironically, by sophisticated economic analytical modeling of the labor market. In a [March 2018 report](#) originally developed for the US Chamber of Commerce, Burning Glass Technologies has combined its proprietary job postings data (demand), BLS JOLTS survey data on job separations (supply), and US Census Current Population Survey data on job turnover/churn to estimate that openings in Business and Financial Operations exceed supply by over 985,000 openings; this translates to demand exceeding supply by 21%-- an excess only surpassed in the healthcare practitioner field (44%). This demand excess indicates a fundamental current misalignment between education and workforce systems in a rapidly changing labor market.

Given the growth in excess demand for economic analysts, Clemson economics faculty have an opportunity to train master's students for careers in finance, business, and government service—and, as a result, contribute to the Burning Glass report's #1 recommendation regarding improved alignment between education systems and the real-time labor market.

The strong sense that our faculty have developed from participation in professional forums such as the National Association of Business Economists is that there is market clarity in the demand for master's students who understand economic (as distinct from finance and business) principles and can apply them to big data because masters level training is well-designed for delivering this 1-2 combination, the supply of masters-educated students is larger than for PhDs, and because there is better value to businesses in not having to pay a higher market price for PhD graduates to get these skillsets.

Additionally, the MS Economic Analytics degree would be the only economics masters program in the State that would qualify as a USCIS-defined STEM program on the basis of its CIP code. This qualification particularly adds to its attractiveness among international students because of enhancements to the length of pre- or post-completion Optional Practical Training for F-1 visa students. Given the dramatic gap between supply and demand, this incentive is important for maximizing supply of human capital.

#### **Transfer and Articulation**

*Identify any special articulation agreements for the proposed program. Provide the articulation agreement or Memorandum of Agreement/Understanding.*

N/A

#### **Employment Opportunities**

Occupation	State		National		Data Type and Source
	Expected Number of Jobs	Employment Projection	Expected Number of Jobs	Employment Projection	
Economist	N/A	N/A	21,000	8% (by 2028)	<a href="https://www.bls.gov/ooh/home.htm">https://www.bls.gov/ooh/home.htm</a>
Market research analyst	N/A	N/A	681,900	20% (by 2028)	<a href="https://www.bls.gov/ooh/home.htm">https://www.bls.gov/ooh/home.htm</a>
Statisticians	N/A	N/A	47,300	30% (by 2028)	<a href="https://www.bls.gov/ooh/home.htm">https://www.bls.gov/ooh/home.htm</a>
Financial Analyst	N/A	N/A	329,500	6% (by 2028)	<a href="https://www.bls.gov/ooh/home.htm">https://www.bls.gov/ooh/home.htm</a>

### Supporting Evidence of Anticipated Employment Opportunities

The supply-demand gap in jobs related to economic analytics is only a proximate gap. The fundamental cause of this labor market anomaly is a skills gap. The rapid changes in technology and data access that create these skills gaps and concomitant opportunities for those with economics analytics skills also, alas, create lags and gaps in traditional labor market data: traditional public sector (e.g. BLS) and private sector (e.g. O\*NET) labor market data simply do not uniquely and robustly capture rapidly changing job market positions, and are becoming decoupled from skills market data and specific skill-based (rather than position title-based) employment opportunities.

Accordingly, we suggest that it can be more important for the Commission to examine skills market data rather than jobs market data in evaluating programs related to the 21<sup>st</sup> century wisdom economy. A [September 2019 Burning Glass report](#) indicates that the top fastest growing skills in online jobs postings data from 2015-2018 included artificial intelligence (90%), Fintech (77%), machine learning (49%), data visualization (35%), and data science (33%). Not surprisingly, the more traditional over-generalized position-based data in O\*NET indicate that position postings for computer/information research scientists grew 20% over the 2015-2018 period.

### Description of the Program

The proposed MS Economic Analytics degree is a 30 credit hour program designed to be completed in three semesters (including summer). Students will take 6 credit hours of economic theory, 6 credit hours of economic analytics for business, 6 credits of data analytics for economics, 6 credits hours of elective courses in economics, and 6 credit hours of research culminating in a thesis.

The MS program is designed to also be offered as a [Clemson combination \(BS/BA-MS\) program plan](#). This will enable a well-prepared undergraduate senior economics majors to take graduate economics courses, which can reduce the time necessary to earn the MS degree. An undergraduate economics major with an [approved bachelor-to-graduate plan](#) may enroll in graduate courses and, in so doing, satisfy course content requirements of the master's or bachelor's degrees. However, the numerical credits for a dual-use course cannot be counted twice (i.e., cannot satisfy the minimum numerical credit requirements of both degrees). Students typically choose to have the credits count toward the 30-credit minimum for the master's degree. A maximum of 12 credit hours of graduate courses that satisfy requirements for the master's may be taken for dual use. Approved graduate courses may satisfy electives of the bachelor's degree or approved 8000-level courses may be substituted for required

undergraduate courses. The curricular requirements for the MS component of the BA-BS/MS combination program plan are identical to those for the standalone MS.

In the detailed model table below, *New* program enrollees are listed in *x/y* format where *x* represents new matriculants who have applied directly to the MS program and *y* represents Clemson Economics baccalaureate recipients transitioning to enrollment in the MS program as part of the combination degree program plan. The table does not include Clemson undergraduates enrolled in MS graduate *courses* since these students are neither formally fully admitted, nor enrolled in, nor paying graduate tuition for the MS *program* until the term following that in which they completed their baccalaureate degree.

<i>Detailed Projected Enrollment Model – MS Economic Analytics</i>												
<i>Year</i>	<i>Fall Headcount</i>				<i>Spring Headcount</i>				<i>Summer Headcount</i>			
	<i>New</i>	<i>Continuing</i>	<i>Lost</i>	<i>Graduate</i>	<i>New</i>	<i>Continuing</i>	<i>Lost</i>	<i>Graduate</i>	<i>New</i>	<i>Continuing</i>	<i>Lost</i>	<i>Graduate</i>
2020-21	2/1	0	0	0	0/3	3	0	0	0/1	6	0	7
2021-22	5/1	0	0	0	0/3	6	0	0	0/1	9	0	10
2022-23	8/2	0	0	0	0/3	10	0	0	0/1	13	0	14
2023-24	9/2	0	0	0	0/3	11	0	0	0/1	14	0	15
2024-25	9/2	0	0	0	0/3	11	0	0	0/1	14	0	15

<b>Projected Enrollment</b>			
<b>Year</b>	<b>Fall Headcount</b>	<b>Spring Headcount</b>	<b>Summer Headcount</b>
2020-2021	3	6	7
2021-2022	6	9	10
2022-2023	10	13	14
2023-2024	11	14	15
2024-2025	11	14	15

*Explain how the enrollment projections were calculated.*

The estimates for enrollment were based on current enrollments and enrollments at peer institutions that have similar programs. We believe that the STEM CIP-code designation, skills gaps in the labor market, and the analytics curriculum will boost enrollments by one or two students compared to our extant MA program in the short-run, and have a longer-run impact that will raise the enrollments above the extant MA program’s historical average by three to five students.

While Clemson’s graduate programs are nationally and internationally competitive, it remains the case that – on the whole—most graduate applications come from South Carolina, North Carolina, and Georgia. The US Census Bureau’s 2017 5-year American Community Survey micro-data indicates that the 21-28 year-old population in these three states having a bachelor’s degree in economics as their highest degree is 7125. The typical headcount enrollment in our model represents 0.2% of this population.

*Besides the general institutional admission requirements, are there any separate or additional admission requirements for the proposed program? If yes, explain.*

Yes

No

For those undergraduate economics majors who are approved to participate in the combination BS/BA Economics-MS Economic Analytics program plan, full formal admission to the MS component is not granted until the term following that in which they received their baccalaureate degree. The GRE requirement for graduate admissions is eliminated for those students who are approved to complete the combination baccalaureate-graduate program plan. A minimum of 90 credit hours and a minimum GPA of 3.4 is required of our baccalaureate student for approval to participate in the combination degree program plan.

## Curriculum

### New Courses

*List and provide course descriptions for new courses*

#### ECON 8430 Markets, Competition, and Strategy

This course covers the economics of markets and industries, particularly when firms strategically interact with each other and with consumers. The focus is to analyze why imperfect competition arises and determine how deviations from characteristics of perfect competition affect the structure, conduct, and the overall performance of actual markets.

#### ECON 8600 Data Analysis for Economics

Introduction in advanced techniques associated with analyzing large data sets that are frequently used in economic analysis. Topics include data collection and web scraping techniques, data organization, supervised segmentation, support vector machines, linear regression, logistic regression, linear discriminant analysis.

#### ECON 8610 Advanced Data Analysis for Economics

This course emphasizes the use and implementation of modern data analysis to examine and analyze data that sets that are frequently encountered in business and economics. Topics include a review of linear regression models and hypothesis testing. Advanced topics ridge regressions, shrinkage methods including ridge regressions, lasso regressions, principal components, partial least squares, polynomial regressions and tree based methods including random forests. Students will apply these techniques to economic applications where supervised and unsupervised machine learning may be appropriate.

#### ECON 8700 Economic Analytics for Business

Introduction to advanced analytical tools for use with economic data and models to inform business. Application of methods using large datasets and communication of estimates to convey actionable business inputs to decision makers. Topics include hypothesis testing, regression analysis, estimation, methods to establish causal inference, limited dependent variable models (logit and probit), and indicator and categorical variables.

#### ECON 8710 Advanced Economic Analytics for Business

Introduction to advanced analytical tools for use with economic data and models to inform business. Application of methods using large datasets and communication



of estimates to convey actionable business inputs to decision makers. Topics include panel data methods to establish causal inference such as experiments, difference-in-differences, instrumental variables, regression discontinuity, matching estimators, and heterogeneous treatment effects.

**Typical One-Year Sequence of Courses for Proposed MS Economic Analytics**

<b>Semester</b>	<b>Course</b>	<b>Credits</b>
Fall	Microeconomics for Public Policy (ECON 8230)	3
Fall	Economic Analytics for Business (ECON 8700)	3
Fall	Data Analysis for Economics (ECON 8600)	3
Fall	An elective 6000- or 8000-level ECON or other pre-approved course	3
	Subtotal for Fall	12
Spring	Markets, Competition, and Strategy (ECON 8430)	3
Spring	Advanced Economic Analytics for Business (ECON 8710)	3
Spring	Advanced Data Analysis for Economics (ECON 8610)	3
Spring	An elective 6000- or 8000-level ECON or other pre-approved course	3
	Subtotal for Spring	12
Summer	Thesis Research (ECON 8910)	6

Total Credit Hours Required: **30**

Curriculum by Year					
Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
<b>Year 1</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
Microeconomics for Public Policy (ECON 8230)	3	Markets, Competition, and Strategy (ECON 8430)	3	Thesis Research (ECON 8910)	6
Economic Analytics for Business (ECON 8700)	3	Advanced Economic Analytics for Business (ECON 8710)	3		
Data Analysis for Economics (ECON 8600)	3	Advanced Data Analysis for Economics (ECON 8610)	3		
An elective 6000- or 8000-level ECON or other pre-approved course	3	An elective 6000- or 8000-level ECON or other pre-approved course	3		
Total Semester Hours	12	Total Semester Hours	12	Total Semester Hours	6

**Similar Programs in South Carolina offered by Public and Independent Institutions**

Identify the similar programs offered and describe the similarities and differences for each program.

<b>Program Name and Designation</b>	<b>Total Credit Hours</b>	<b>Institution</b>	<b>Similarities</b>	<b>Differences</b>
MS Applied Economics and Statistics	30	Clemson	2 courses in economic theory, two courses in econometrics	The proposed MS in Economic Analytics will have two data analytics courses required
MA Economics	30	Clemson	2 courses in economic theory, one course in econometrics	The proposed MS in Economic Analytics will have two data analytics courses required and an additional econometrics course required
MA Economics	30	USC - Columbia	2 courses in economic theory, one course in econometrics	The proposed MS in Economic Analytics will have two data analytics courses required and an additional econometrics course required while the USC program requires a course in applied statistics
MS Data Science and Analytics	30	Clemson	Focus on data analytics	The proposed MS in Economic Analytics provides training in economics and applies data analysis to economic and business decisions. The Data Science and Analytics program is more general and is also online only.
MBA (Business Analytics concentration)	36	Clemson	Focus on business analytics	The MBA provides more of a managerial focus while the proposed MS in Economic Analytics emphasizes economic applications and also requires a thesis.
MS Data Science and Analytics	36	College of Charleston	Both programs include coursework covering machine learning, data analytics, data mining	The CoC program is more general and does not include any coursework on economics, economic data analytics, or economic analysis
MS Business Analytics	0	USC Upstate	Both programs include data visualization, data mining, and predictive analytics	The USC Upstate program focuses more generally on business but does not include coursework specifically focused on economics or economic analytics

**Faculty**

<b>Rank and Full- or Part-time</b>	<b>Courses Taught for the Program</b>	<b>Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major</b>	<b>Other Qualifications and Relevant Professional Experience (e.g., licensures, certifications, years in industry, etc.)</b>
Professor of the Practice #1  Full-Time	ECON 8600 (Data Analysis for Economics) and ECON 8610 (Advanced Data Analysis for Economics)	Ph.D. University of Chicago	
Full Professor #1 (or Associate Professor #1)  Full-Time	ECON 8700 (Economic Analytics for Business)	Ph.D. Michigan State University (Ph.D. University of Maryland)	
Associate Professor #2  Full-Time	ECON 8710 (Economic Analytics for Business)	Ph.D. University of Chicago	
Full Professor #2  Full Time	ECON 8430 (Markets, Competition and Strategy)	Ph.D. University of California at Berkeley	

**Faculty, Staff, and Administrative Personnel**

*Discuss the Faculty, Staff, and Administrative Personnel needs of the program.*

Total FTE (full-time equivalent) needed to support the proposed program: 1.5 FTE

Staff:

Administration:

In order to support the program, one FTE position will be devoted half-time to support the Data Analysis courses (ECON 8600 and 8610). For the other core courses in the sequence (ECON 8230, ECON 8700, ECON 8710, and 8430), there will be four faculty members who each teach one of these courses. In the fall and in the spring, there is an elective course the students can choose from. These courses can be 600/800 level courses. We typically have three 600-level courses each semester the students can choose from as well as the Ph.D. level courses (though we think it is unlikely many students will opt for the PhD courses); these are already supported/offered. No additional staff is needed to support the program; a current program administrative assistant will assist with recruitment and placement.

## Resources

### Library and Learning Resources

*Explain how current library/learning collections, databases, resources, and services specific to the discipline, including those provided by PASCAL, can support the proposed program. Identify additional library resources needed.*

The Clemson University Libraries' resources required for the proposed program are already in place; therefore, there is no need for additional library resources. All major journals in the discipline are available online or through open access. The Clemson University Libraries hold more than 1.8 million items including books, periodicals, electronic resources, digital media collections, government publications and patents, musical recordings, maps and microforms. Over 4,000 print journal titles, 49,000 e-journals, 170,000 e-books, and 480 online databases are available. Cooper Library is linked electronically to the On-line Computer Library Center Inc. and *WorldCat* database providing access to more 71,000 libraries worldwide for interlibrary loan services. PASCAL and Kudzu Consortium provide access to 12 million volumes held by academic libraries in SC and 30 million volumes by 17 SE universities.

Students request journal articles through interlibrary loan and are emailed in 2-3 days. Reference librarians assist students by telephone, text, instant message and in-person consultation 79 hours per week and the College of Business and the field of economics have a dedicated research librarian. In addition to annual expenditures, current Library policy allocates additional funds for the exclusive purchase of materials for newly approved programs, if needed. Prioritizing funds for electronic resources, CU demonstrates a commitment to online educational programs and no new funding is required to support the library and learning resources.

*My Library Account:* Students enrolled in off campus programs can log in to their My Library Account to search the Clemson Libraries catalog and request the delivery of print books. In addition to print books, Clemson affiliates have access to 458,239 electronic books via individual subscriptions, aggregator databases, and consortial agreements.

*Books and Articles not owned by Clemson University Libraries:* Students may use the PASCAL Delivers service to borrow books from any college or university in South Carolina. Requests are made through the Clemson University Libraries home page and delivered to a participating Charleston library. Students can borrow up to 25 books for six weeks, with an additional three-week renewal period.

If a book is not owned by the Clemson University Library and is not available via PASCAL Delivers, students may directly request the item from the Reference Librarian. Approved books will be rush ordered/cataloged and sent to the requesting patron, who will be responsible for returning them to Cooper Library (via either mail or return to a PASCAL Delivers library.)

Articles owned by Clemson University Libraries: Students requiring articles from print journals owned by the Library may request a scanned copy via <http://www.clemson.edu/culib/forms/secure/ill/emp/dd-rp.php>. Articles not available from Clemson University Libraries: Students also have free access to interlibrary loan to request copies of articles from journals not available at Clemson. Students must create an account prior to borrowing via the following website: <http://libguides.clemson.edu/ill>.

*Reference Assistance:* Students encountering difficulties finding resource materials may contact the Reference Librarian, who will respond to requests often immediately or within 24 hours. Students also have access to the Ask a Librarian service to request immediate assistance via phone/chat /text/ or email during normal Reference Desk hours.

### **Student Support Services**

*Explain how current academic support services will support the proposed program. Identify new services needed and provide any estimated costs associated with these services.*

In addition to library and learning resources, a number of academic and student support services are available to all graduate students—including online students—at Clemson University:

- **Clemson Computing and Information Technology (CCIT)** - Provides a leading-edge integrated information environment integral to learning and research. Graduate students may (but are not limited to) take advantage of services such as Clemson email account, emergency text messages, mobile guidebooks, video conferencing, web development, and data storage. Help services are available via phone, email, or online chat.
- **Student Accessibility Services** – Graduate Students may register with Student Accessibility Services to use services such as academic access letters, assistive technology, communication services, test proctoring center and electronic textbooks.
- **Center for Career and Professional Development** – Clemson University is dedicated to engaging students in career development that will empower them to successfully pursue their educational and professional goals. Services provided by the career center include career workshops, resume writing, career development, job search assistance, and networking.
- **Legal Assistance** - All Clemson students are eligible to receive one legal aid voucher per semester. Each voucher entitles the student to one-half hour consultation with a lawyer off campus.
- **GRAD 360°**- A professional development program affiliated with The Graduate School that provides students with a structured way to develop and track their proficiency in the academic, personal, and professional focus areas known as “The Tiger 9”: career development; personal health, wellness and financial literacy; research and innovation; professionalism and ethics; leadership and management; teamwork and collaboration; teaching and learning; oral, written and intercultural communication; and social and global responsibility. Each student’s development program can be tailored to meet their unique needs and interests. Students can identify their skills, interests, and values throughout their Clemson experience; engage their advisors in holistic advising and mentoring; acquire and develop specific skills necessary for postgraduate professional practice; and track their transformation by recording their experience in an online portfolio.
- **International Services** – The Office of Global Engagement’s International Services area works with incoming international students to provide valuable information, service and advice to meet their unique needs. International Services is a valuable resource for international students’ immigration, employment, and support needs, and works to create a welcoming, positive environment for Clemson’s international student population to help them meet their academic and research goals while making sure their personal goals are taken into consideration.
- **Counseling and Psychological Services (CAPS)** - Counseling and Psychological Services (CAPS), the mental health department of Student Health Services, offers a wide array of services along a continuum of intensity for various psychological issues.
- **Graduate Student Life** – Operating under the Division of Student Affairs, this is a central body that collaborates with the Graduate School and Graduate Student Government to enhance the overall graduate student life experience.
- **Clemson University Writing Center** – The goal of the writing center is to help all members of the Clemson community become more confident and effective writers.

- **The Harvey and Lucinda Gantt Multicultural Center** - The Harvey and Lucinda Gantt Multicultural Center is committed to creating diverse learning environments that enhance the intercultural competence of our students. The center supports and advocates for the needs of all students, challenges students to think critically about themselves and their communities, provides engaging experiential learning opportunities and empowers students to be positive change agents.
- **Clemson Online** - Clemson Online staff are here to ensure that all online students have access to the same resources and support that a first-class Clemson education comprises for students enrolled in programs having in-person modalities. Clemson University is devoted to ensuring an innovative and substantive educational experience for all students.

### **Physical Resources/Facilities**

*Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements.*

Since this program will emphasize data analytics, we anticipate the students will need to have access to computers with specialized software. The Econometrics Lab in the new College of Business is ideally suited for the students. The lab will have several computers that contain software designed for econometric analytics. There also may be some instances where students may need to use the University's world-class Palmetto Cluster. We imagine this will be rare, and accomplished on a case-by-case basis through the University's standing access process.

### **Equipment.**

*Identify new instructional equipment needed for the proposed program.*

None

### **Impact on Existing Programs**

Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain.

Yes

No

The MS Economic Analytics program is expected to draw a small number of students away from the existing MA Economics program. It is also possible that some students who are not aware of the MA program may become aware of it through research on programs in Economic Analytics. The two are quite different in emphasis, with the new MS being significantly more quantitative while the MA does and will continue to provide a broader background in economic analysis. This new program, with these possible concomitant minor impacts, has been approved by our University Curriculum Committee, Provost, and Board of Trustees.

**Financial Support**

**Sources of Financing for the Program by Year**

Category	1 <sup>st</sup> (AY 2020/21)		2 <sup>nd</sup> (AY 2021/22)		3 <sup>rd</sup> (AY 2022/23)		4 <sup>th</sup> (AY 2023/24)		5 <sup>th</sup> (AY 2024/25)		Grand Total	
	New	Total	New	Total	New	Total	New	Total	New	Total	New	Total
Tuition Funding	\$95,250	\$95,250	\$155,600	\$155,600	\$237,881	\$237,881	\$262,841	\$262,841	\$268,212	\$268,212	\$1,019,785	\$1,019,785
Program-Specific Fees												
Special State Appropriation												
Reallocation of Existing Funds		\$85,125		\$87,931		\$90,836		\$93,845		\$96,961		\$454,698
Federal, Grant, or Other Funding												
<b>Total</b>	<b>\$95,250</b>	<b>\$180,375</b>	<b>\$155,600</b>	<b>\$243,531</b>	<b>\$237,881</b>	<b>\$328,717</b>	<b>\$262,841</b>	<b>\$356,686</b>	<b>\$268,212</b>	<b>\$365,173</b>	<b>\$1,019,785</b>	<b>\$1,474,483</b>

**Estimated Costs Associated with Implementing the Program by Year**

Category	1 <sup>st</sup> (AY 2020/21)		2 <sup>nd</sup> (AY 2021/22)		3 <sup>rd</sup> (AY 2022/23)		4 <sup>th</sup> (AY 2023/24)		5 <sup>th</sup> (AY 2024/25)		Grand Total	
	New	Total	New	Total	New	Total	New	Total	New	Total	New	Total
Program Administration and Faculty/Staff Salaries		\$85,125		\$87,931		\$90,836		\$93,845		\$96,961		\$454,698
Facilities, Equipment, Supplies, and Materials	\$5,250	\$5,250	\$5,355	\$5,355	\$5,462	\$5,462	\$5,571	\$5,571	\$5,683	\$5,683	\$27,321	\$27,321
Library Resources												
Other (Admin Overhead)	\$19,050	\$19,050	\$31,120	\$31,120	\$47,576	\$47,576	\$52,568	\$52,568	\$53,642	\$53,642	\$203,957	\$203,957
<b>Total</b>	<b>\$24,300</b>	<b>\$109,425</b>	<b>\$36,475</b>	<b>\$124,406</b>	<b>\$53,038</b>	<b>\$143,875</b>	<b>\$58,139</b>	<b>\$151,985</b>	<b>\$59,325</b>	<b>\$156,286</b>	<b>\$231,278</b>	<b>\$685,976</b>
<b>Net Total</b> (Sources of Financing Minus Estimated Costs)	\$70,950	\$70,950	\$119,125	\$119,125	\$184,843	\$184,843	\$204,702	\$204,702	\$208,887	\$208,887	\$788,507	\$788,507

**Note:** New costs - costs incurred solely as a result of implementing this program. Total costs - new costs; program's share of costs of existing resources used to support the program; and any other costs redirected to the program.



### Budget Justification

Provide an explanation for all costs and sources of financing identified in the Financial Support table. Include an analysis of cost-effectiveness and return on investment and address any impacts to tuition, other programs, services, facilities, and the institution overall.

The program will leverage the existing faculty in the extant MA Economics program to teach the five new courses for the MS Economic Analytics. The remaining courses in the MS curriculum are currently taught for the MA; therefore, the program will be supported through reallocated resources (portions of salaries already being paid, which also represent sunk costs) and tuition revenue. The tuition projections are based on 3% tuition growth per year, and will be strategically reinvested in faculty and programmatic support.

### Revenue Highlights:

- **Tuition Funding:** The program will use Graduate Tier 2 tuition, congruent with the MA Economics program, of \$635 per credit hour for all newly admitted students. Based on the estimated enrollment, tuition revenue will be \$95K in Year 1 and \$268K by Year 5 for a 5-year total of approximately \$1M.
- **Reallocation of Existing Funds:** The program will utilize resources already allocated to ongoing support of the faculty/staff salary and fringe at an average of \$12.5K per course as listed in Expense Highlights. Reallocated resources total \$85K in Year 1 and \$97K by Year 10.

### Expense Highlights:

- **Program Administration and Faculty and Staff Salaries:** There are five new courses associated with the proposed program; however, these courses will be taught through the existing workload of the current MA Economics faculty. This extant program shares a portion of the curriculum with the proposed MS; thus, no new or additional personnel are required. The reallocated resources will be used to support the faculty and staff salaries at an average market salary of \$12.5K plus fringe per course. The personnel costs are approximately \$85K in Year 1 and \$97K by Year 10.
- **Facilities, Equipment, Supplies, and Materials:** The program will be allocated \$5K in Year 1 for marketing and advertising (including miscellaneous administrative supplies and minor travel expenses) to increase awareness of the new degree program. Expenditures will increase by 2 percent each year and will reach approximately \$6K by Year 5.
- **Other Expenses:** Administrative Overhead was calculated at 20 percent of tuition revenue each year. Administrative Overhead is estimated to be \$19K in Year 1 and \$54K by Year 5.

### Evaluation and Assessment

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
Develop students' ability to apply economic theory to improve private and public sector decision-making	Students will apply economic theory to a wide variety of individual behavior, business practice, market outcomes, and government policy.	Performance in core economic theory courses and advisory committee review of theses will be used to assess these outcomes.
Develop students' ability to use tools of econometrics for prediction and causal explanation	Students will specify and estimate economic-statistical models, test hypotheses with inferential statistics, and interpret estimated parameters in the models.	Performance in core econometrics courses and advisory committee review of theses will be used to assess these outcomes
Develop students' ability to collect, organize, describe, and	Students will demonstrate the use of advanced techniques for	Performance in core data analytics courses and committee

display large data sets for business and economics	data collection, web scraping, organization of large datasets, visualization, and a variety of data analysis tools	review of theses will be used to assess these outcomes
Develop students' ability to effectively communicate to professional and policy making audiences	Students will clearly and effectively communicate findings and implications of their economic research.	Students are rated by members of their advisory committees on the quality of the writing in their theses and oral communication during their defenses of their research.
Develop scientific literacy and independent research skills	Students will conduct independent research that results in an original contribution to knowledge in economics	Students are rated by thesis committee chairs in five areas: question formulation, review of literature, application of economic theory, analysis of data, and communication of findings

*Explain how the proposed program, including all program objectives, will be evaluated, along with plans to track employment. Describe how assessment data will be used.*

Thesis advisors and the MS program coordinator will contribute to a database maintained at the departmental level tracking employment. Annual correspondence with those in the database will provide continued updates. The database will be maintained in Clemson's cloud storage system so that all faculty have access to the information.

Assessment data will be collected from instructors of the core courses and thesis committees, and summarized on an annual basis to determine if we are meeting our program and student learning objectives. Student and employer feedback and market assessment will be used to assess if any changes in the curriculum are needed.

### **Accreditation and Licensure/Certification**

Will the institution seek program-specific accreditation (e.g., CAEP, ABET, NASM, etc.)? If yes, describe the institution's plans to seek accreditation, including the expected timeline.

Yes

No

Will the proposed program lead to licensure or certification? If yes, identify the licensure or certification.

Yes

No

Explain how the program will prepare students for this licensure or certification.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline.

Yes

No



26 May 2020

South Carolina Commission on Higher Education  
1122 Lady Street, Suite 300  
Columbia, SC 29201

Dear Commissioners, Commission Staff, and ACAP Members,

This letter confirms our continuing institutional commitment to the new program proposal for an MS Economic Analytics degree to be initially reviewed at the 9 June 2020 meeting of the Advisory Committee on Academic Programs. After re-examining the proposal in light of uncertainties related to the current COVID19 pandemic, the University still endorses the need for and goals of this proposal.

The proposal cited data-backed voracious market demand for workforce participants with the skills provided by this program. We do not believe that demand will abate in the near or long-term. Indeed, the need to combine quantitative science, technology, and social science to help businesses analyze markets and meet the demands of their end-user clients is now more important than ever.

There are no new costs for program administration, faculty, or staff—and thus no new expense to the State. This circumstance is due to the program's delivery coming from extant sunk resources in the extant MA Economics program. The true new incremental costs—approximately \$27K over 5 years—support advertising and marketing efforts. These are adequately covered by program revenues.

On the final page of this proposal re-certification, we provide some data regarding external demand related to the degree. This comes from Chmura Economics' JobsEQ<sup>®</sup> suite, which integrates labor market, IPEDS, jobs posting, US Census Bureau, BLS, and other data at multiple geographic scales to provide historical, current, and forward-looking views of degree programs from an external demand perspective using a robust, custom CIP-to-SOCS code crosswalk.

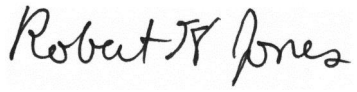
The job postings data from Chmura's Real Time Information<sup>®</sup> support this recertification. The longitudinal data indicate employer market demand at the masters level or less, as measured from daily SC job postings, has remained on par to last year's demand as of mid-May. This has been the case throughout the duration of the current COVID19 pandemic.

**Robert H. Jones**  
**Executive Vice President for**  
**Academic Affairs and Provost**

Office of the Provost  
Clemson University  
206 Sikes Hall  
Clemson, SC  
29634

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Please let us know if we can answer any additional questions or provide further information about this new program proposal from our nationally-recognized economics faculty.

A handwritten signature in black ink that reads "Robert H. Jones". The signature is written in a cursive style with a large, stylized "R" and "J".

Robert H. Jones  
Executive Vice President for  
Academic Affairs and Provost

# Associated Occupations

Associated occupations are matched using a custom crosswalk based on the CIP2010-to-SOC2010 tables and updated to include matches from the CIP2020-to-SOC 2018 tables, when data is available.

The CIP 2020 to 2018 SOC crosswalk adds 15-2051 Data Scientist to the list of occupations crosswalked to CIP code 45.0603. Prior to the adoption of the 2018 SOC, many data scientists positions were classified under 15-1111 Computer and Information Research Scientists, thus it has been included as an associated occupation. 15-2041 Statisticians and 19-4061 Social Science Research Assistants have also been added because of their inclusion in the newer crosswalk.

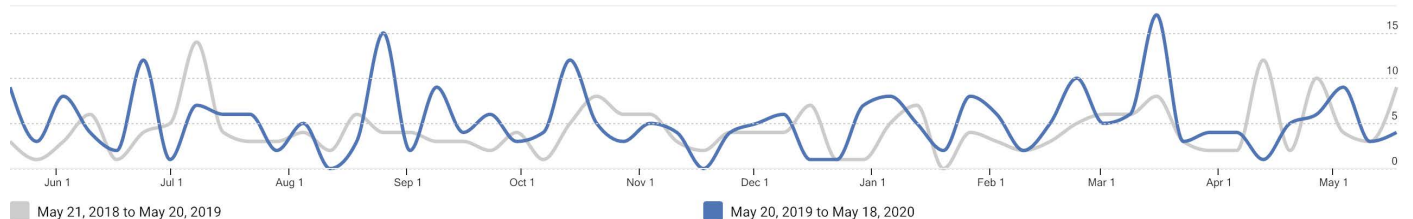
11-9199 Managers, All Other, was removed as an associated occupation because of lack of specificity.

CIP 2010	SOC 2010	
45.0603	19-3011	Economists
	25-1063	Economics Teachers, Postsecondary
11.0101	15-1111	Computer and Information Research Scientists
27.0501	15-2041	Statisticians
45.0101	19-4061	Social Science Research Assistants
52.1301	15-2031	Operations Research Analysts

## Daily Online Job Posts for Associated Occupations

- Region: South Carolina
- Education Level: Bachelor's Degree | Master's Degree

New Job Posts by Date



Note: Data are subject to revision. Time series data can be volatile with trends unrelated to actual changes in demand; use with caution.

The blue line in the graph above reflects the number of online ads for the associated occupations posted each day over the last 12 months. The grey line reflects jobs added on the same day last year.