

**Request for Authorization to Establish a
Bachelor of Science in Interdisciplinary Studies
(BS, CIP 24.0101) at
Appalachian State University**

I. Program Highlights

- Appalachian State University's proposed Bachelor of Science in Interdisciplinary Studies degree program would prepare students for professions or graduate study in science or social science. Appalachian currently offers a BA program in Interdisciplinary Studies to help with retention, progression, and graduation rates for students who are interested in pursuing studies in emerging disciplines or fields of study that are not offered at the university. The purpose of the proposed degree program would be to provide students in science, math, or social science fields with an individualized program of study leading to a BS degree, which is more often desired by employers or graduate schools. The benefit to graduates is the ability to design a plan of study for careers in new and emerging fields while preparing for the option of graduate and professional study.
- The proposed degree program would require 120 total credit hours. The proposed curriculum would require general education courses (44 credit hours), major courses (48 credit hours), a minor (12-21 credit hours), and electives (7-16 credit hours).
- The proposed degree program would be administered on campus.
- Seven full-time students on campus are projected in the first year. Twenty-five full-time students on campus are projected by the fourth year.
- No increase in funds will be requested from state or non-state agencies. No tuition differential will be sought to support the proposed degree program.
- The library's resources are adequate to support the proposed degree program.
- The facilities are adequate to support the proposed degree program.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

1. **Existing Programs (Number, Location, Mode of Delivery).** The UNC System has 10 institutions offering a combined 13 bachelor of arts, bachelor of individualized study, or BS programs in interdisciplinary studies. They include Appalachian (BA on campus), Elizabeth City State University (BA online), Fayetteville State University (BS on campus and online), North Carolina State University (BA and BS on campus), North Carolina Central University (BA on campus), the University of North Carolina at Asheville (BA on campus), the University of North Carolina at Pembroke (BIS on campus and online), the University of North Carolina Wilmington (BA on campus and online), the University of North Carolina at Chapel Hill (BA on campus), and Western Carolina University (BA and BS on campus, B on campus and online).
2. **Relation to Campus Distinctiveness and Mission.** The proposed degree program would align with Appalachian's mission to advance knowledge and address challenges of our region, state and world through creativity and innovation. The proposed degree program would also align with the university's Strategic Direction #1, "Creating the Transformational Educational Experience." It would support the University's strategic initiative for the Undergraduate Experience, by helping to "Facilitate interdisciplinary and integrative approaches to teaching and learning, with new and traditional pedagogies that incorporate technology, to prepare twenty-first century students to

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be flexible, creative problem-solvers who can adapt to changing work requirements and life situations."

- 3. Demand (local, regional, state).** The greatest strength of the individually designed interdisciplinary program for students and institution alike is that it provides a flexible degree that can be responsive to emerging student interests and societal needs. The proposed degree program would provide institutional flexibility for students interested in emerging disciplines in the sciences/ social sciences. Recent graduates of the BA program in Interdisciplinary Studies have entered a range of careers, including independent businesses, the music industry, expressive arts therapy, museum and cultural heritage site work, and graduate study. Some recent graduates who are now in careers in which a BS is a more common credential include: software developer (Wilmington, NC), foundation program coordinator (Los Angeles, CA), associate graphic designer (Raleigh, NC), information technology support technician (Nashville, NC), medical clinical assistant (Boone, NC), graduate student for MS in sports management (Norfolk, VA).
- 4. Potential for Unnecessary Duplication.** Although thirteen schools in the UNC System offer a bachelor's degree for interdisciplinary studies, only three offer the BS option: FSU, NC State, and Western Carolina. Appalachian currently offers a BA in Interdisciplinary Studies, but the proposed degree program would serve students who want to combine math, science and/or social science curricula in their self-design program of study. The option would offer a more accurate description of their proposed program of study. It would also benefit students who are pursuing graduate school or career trajectories in which a BS is more appropriate.
- 5. Employment Opportunities for Graduates.** The US Bureau of Labor Statistics' (BLS) 2017 Career Outlook reported opportunities in several occupations related to liberal arts degrees, "designed to prepare students for a variety of career options, rather than for a specific occupation." Numerous occupations were listed, reporting earnings for full-time employees under the age of 35 in 2015. The jobs required skills in communication, problem-solving, and broad knowledge across different subjects. There were 222,762 recipients of a bachelor's degree in political science and government who earned a median annual wage of about \$43,730. There were 226,034 recipients of a bachelor's degree in English language and literature who earned a median annual wage of about \$38,710. In addition, 373,736 recipients of a bachelor's degree in communications had a median annual wage of about \$41,600. There were 189,532 recipients of a bachelor's degree in history who earned a median wage of about \$39,520 annually.
- 6. Faculty Quality and Number.** No new faculty will be needed within the first four years to support the proposed program. Existing faculty who teach in support of other degree programs within the Department of Interdisciplinary Studies.
- 7. Availability of Campus Resources (library, space, etc.)** The Carol Grotnes Belk Library's current holdings will provide sufficient support for both research and instruction. In addition, since no new courses have been proposed, the library materials that currently support the BA in Interdisciplinary Studies would support the proposed BS in Interdisciplinary Studies.

Existing university facilities are adequate for support of the proposed degree program. There is enough classroom space to support instruction in the required classes and major electives.

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- 8. Relevant Lower-level and Cognate Programs.** The proposed degree program will be supported by other courses and programs across the university. Appalachian has an existing BA in Interdisciplinary Studies program that allowed students to build programs of study from existing courses, working closely with their academic advisors during the self-design process.
- 9. Impact on Access and Affordability.** No tuition differential will be sought to support the proposed degree program.

Tuition and fees for spring 2020 are as follows:

Full-Time Undergraduate Tuition and Fees Annualized (In Dollars)

	Resident	Non-Resident
Tuition	4,242	19,049
Fees	3,007	3,007
Total Tuition and Fees	7,249	22,056

- 10. Expected Quality.** The success of the program will be judged by evaluating enrollment, student proficiency in learning outcomes, retention and graduation rates, job placement, and the satisfaction of graduates and employers.
- 11. Feasibility of Collaborative Program.** Given the distinct nature of each student's self-design degree program, and the campus-based mode of delivery at Appalachian, NC State, and Western Carolina, there may not be many opportunities for collaboration. It is possible that the three institutions could meet on a regular basis to discuss the challenges and opportunities that self-design degree programs face within the UNC System.
- 12. Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed by the Appalachian faculty, department and university curriculum committees, the provost, and chancellor. Approval was obtained at all levels.

UNC System Office Review Process and Feedback. Throughout the review process, Appalachian provided relevant information pertaining to program requirements and resources. The institution submitted appropriate documentation and research to support its statements. Reviewers evaluated the proposal and requests for information were provided by the institution.

IV. Recommendation

It is recommended that the Board of Governors approve Appalachian's request to establish a Bachelor of Science in Information Technology degree program (CIP 24.0101) to enroll students starting Fall 2020.

**Request for Authorization to Establish a
Master of Science in Health Psychology
(MS, CIP 42.2810) at
North Carolina Agricultural and Technical State University**

I. Program Highlights

- North Carolina Agricultural and Technical State University's proposed Master of Science in Health Psychology degree program would prepare students for employment opportunities such as health educator, health program director, health evaluation, neuropsychology technician, psychometrist and the option to pursue a doctoral degree in health psychology or neuropsychology. The benefits to graduates of the proposed degree program include flexibility in career opportunities, salaries above the national median for earnings, and high job growth rates.
- The proposed degree program would require 30 total credit hours. In addition, students will be required to complete a thesis or a practicum experience.
- The proposed degree program would be administered on campus.
- Fifteen full-time students are projected in the first year. Forty-five full-time students are projected by the fourth year.
- Enrollment increase funds will be sought after the first year to support the proposed degree program. As target enrollments are met, enrollment growth funds would be needed to support the additional faculty member and future growth requirements.
- Current faculty members would absorb the teaching responsibilities in the first year. It is anticipated that two additional faculty members would be needed during year two and three. Funds from enrollment increases after the first year would be used to support new faculty.
- No tuition differential will be sought to support the proposed degree program.
- The library's resources are adequate to support the proposed degree program.
- The facilities are adequate to support the proposed degree program.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

1. **Existing Programs (Number, Location, Mode of Delivery).** There are no other master's level programs in health psychology in the UNC System. East Carolina University offers master's programs in school and industrial organizational psychology; Western Carolina University offers master's degrees in clinical and school psychology; The University of North Carolina at Charlotte offers master's degrees with concentrations in cognitive science and community psychology; and The University of North Carolina at Greensboro has a master's degree program in experimental psychology.
2. **Relation to Campus Distinctiveness and Mission.** The proposed degree program would align with ECU's mission to advance knowledge through scholarly exchange and transforms society with exceptional teaching, learning, discovery and community engagement. The degree program would support the goals of the North Carolina A&T State University *2020 Preeminence Plan*, including (1) promoting a vigorous STEM-oriented academic environment (2) enhancing community engagement and (3) expanding opportunities for faculty and student involvement in funded research as a premier research, science and technology focused doctoral institution.

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- 3. Demand (local, regional, state).** Information provided from NC Tower indicated a strong market for health professionals in North Carolina. The average wages for graduates of public universities in the state with a master's degree in health professions and related programs was \$54,936 after one year and \$73,154 after five years.
- 4. Potential for Unnecessary Duplication.** The proposed degree program would not create unnecessary competition, given that there are no other terminal master's level health psychology programs in the UNC System. Most terminal master's programs are in industrial or school psychology. East Carolina University offers master's programs in school and industrial organizational psychology; Western Carolina offers master's degrees in clinical and school psychology; and UNC Charlotte offers master's degrees with concentrations in cognitive science and community psychology. UNC Greensboro has a master's degree program in experimental psychology. The proposed degree program would contain a different curricular focus that would not be a direct competitor to existing programs.
- 5. Employment Opportunities for Graduates.** The Bureau of Labor Statistics (BLS) has not yet given health psychologists their own category, listing them instead as "clinical, counseling and school psychologists," with an average annual salary of \$81,330 as of May 2017. The top 10% earned more than \$123,920 per year. The BLS also indicates that employment opportunities are anticipated to increase from 2014-2024. Overall employment of psychologists is projected to grow 19 percent from 2014 to 2024, much faster than the average for all occupations. Many options exist in the labor market for individuals with a master's degree in health psychology with several areas of specialty. Clinical health psychology emphasizes direct interaction in a hospital or community health facility. Clinical neuropsychology emphasizes the relationship between the brain and behavior through neuropsychological assessment. Community and public health psychologists focus on the development, evaluation, and monitoring of health and wellness systems and their impact on communities.
- 6. Faculty Quality and Number.** Current faculty members would absorb the teaching responsibilities in the first year. It is anticipated that two additional faculty members would be needed during year two and three. Funds from enrollment increases after the first year would be used to support new faculty.
- 7. Availability of Campus Resources (library, space, etc.)** The Bluford Library provides materials and services to support university programs including the College of Health and Human Science. The library's holdings are adequate to support the proposed degree program. The resources include access to books, databases for journal articles, endnote, study rooms, computing and printing, and workshops. The Bluford Library maintains a special guide for the Community of Graduate Scholars online. Graduate students may sign up for individual instruction sessions.

NC A&T State University's new Science Building has 10 psychology research laboratories that are currently used for research and training of undergraduates and can accommodate graduate training. The university provided more than \$125,000 in start-up funds for research 'Faculty of the Future' hires. These funds have contributed to efforts to establishing new research laboratories. The classroom space is adequate for seminars, lectures, and distance learning.

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- 8. Relevant Lower-level and Cognate Programs.** The undergraduate psychology program is a popular major at NC A&T State University. It is anticipated that many students within the Department of Psychology department would find the proposed degree program attractive. On average, approximately 40% of psychology students graduate with the minimum standards to be admitted to the proposed degree program.

No other subject-matter fields would be necessary to support the proposed degree program.

- 9. Impact on Access and Affordability.** No tuition differential will be sought to support the proposed degree program.

Tuition and fees for spring 2020 are as follows:

Full-Time Graduate Tuition and Fees Annualized (In Dollars)

	Resident	Non-Resident
Tuition	4,745	17,545
Fees	3,010	3,010
Total Tuition and Fees	7,755	10,555

- 10. Expected Quality.** The success of the program will be judged by evaluating enrollment, student proficiency in learning outcomes, retention and graduation rates, job placement, and the satisfaction of graduates and employers.
- 11. Feasibility of Collaborative Program.** There are several opportunities for collaboration with institutions regionally. The graduate program director at UNC Charlotte expressed an interest in establishing a relationship with North Carolina A&T State University for graduating students who are interested in pursuing a PhD (through their Pipeline program). Wake Forest University expressed a similar interest. North Carolina A&T State University would also establish collaborations with industry-partners in order to ensure the availability of experiential opportunities to improve career readiness for students.
- 12. Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed by the North Carolina A&T State University faculty, department and university curriculum committees, the provost, and chancellor. Approval was obtained at all levels.

UNC System Office Review Process and Feedback. Throughout the review process, North Carolina A&T State University provided relevant information pertaining to program requirements and resources. The institution submitted appropriate documentation and research to support its statements. Reviewers evaluated the proposal and requests for information were provided by the institution.

IV. Recommendation

It is recommended that the Board of Governors approve North Carolina A&T State University's request to establish a Master of Science in Health Psychology degree program (CIP 42.2810) to enroll students starting fall 2020.

**Request for Authorization to Establish a
Bachelor of Science in Economics
(BS, CIP 45.0603) at
University of North Carolina at Chapel Hill**

I. Program Highlights

- The University of North Carolina at Chapel Hill's proposed Bachelor of Science in Economics degree program would prepare students for careers in business, public policy, and the social sciences. Relative to the existing BA in economics, the proposed degree program would provide stronger emphasis on skills that are in increased demand by employers, including data analysis and quantitative techniques. The benefit of the proposed degree program to graduates include salaries above the national median for earnings, high job growth, and greater preparation in mathematics, statistics and operations research, and computer science relative to existing programs.
- The proposed degree program would require 120 total credit hours. In addition to general education requirements, the proposed degree program would require 51 to 52 total credit hours from 16 courses. This would include five required and five elective courses in the economics department, plus four required and two elective courses in other departments (MATH, COMP, and STOR). The variation in credit hours (51 to 52) is due to differences among non-ECON elective courses.
- The proposed degree program would be administered on campus.
- Two hundred and forty full-time students are projected in the first year. Three hundred and twenty full-time students are projected by the fourth year.
- No tuition differential will be requested. No additional funding will be required to support the proposed degree program.
- No new faculty will be needed to support the proposed degree program.
- The library's resources are adequate to support the proposed degree program.
- The facilities are adequate to support the proposed degree program.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

1. **Existing Programs (Number, Location, Mode of Delivery).** Twelve universities within the UNC System offer a BS in economics on campus, including Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina State University, University of North Carolina at Charlotte, The University of North Carolina at Greensboro, The University of North Carolina at Pembroke, University of North Carolina Wilmington, Western Carolina University, and Winston-Salem State University. In addition, two private institutions offer a BS in economics degree program on campus: Duke University and Wake Forest University.
2. **Relation to Campus Distinctiveness and Mission.** The proposed degree program would support the mission of UNC-Chapel Hill to serve as a center for research, scholarship, and creativity and to teach a diverse community of undergraduate, graduate, and professional students to become the next generation of leaders. It would also help fulfill the UNC System's mission to transmit and

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apply knowledge to address the needs of individuals and society by establishing a new degree program that is influenced by modern job market and educational opportunities.

- 3. Demand (local, regional, state).** Economics majors have strong employment prospects in North Carolina. The state's workforce system, NC Works, ranks the labor market demand in North Carolina for those with an economics degree as "high." On February 2, 2019, for example, there were 1,489 online postings at NC Works for jobs in North Carolina related to economics. Furthermore, economics is a relatively high paying major in North Carolina. In 2017, NC Works reports that entry level wages for economists were \$54,320, median wages were \$88,620, and experienced wages were \$106,800. In comparison, entry level wages among all occupations were \$20,280, median wages were \$34,750, and experienced wages were \$58,980.

According to NC Works, in December of 2018 the five top advertised job skills found in job openings advertised online for economists were: business planning, economic forecasting, operations management, research analysis, and risk management. The data analytics and quantitative analysis focus of the proposed BS degree program would enhance graduates' forecasting and research analysis skills. Furthermore, it would give students the math, statistics, and analytical skills necessary for several other occupations that are projected to experience above-average growth in North Carolina. For example, between 2016 and 2026, market research analysts and marketing specialist positions are projected to increase by 28.8%, operation research analyst positions are projected to increase by 27.5%, and financial analyst positions are projected to increase by 10.8%. In comparison, the projected growth for general economists is 6.1% over the same time period.

- 4. Potential for Unnecessary Duplication.** Twelve institutions in the UNC System offer the BS in economics according to organizational models that place the program within a business school. The proposed degree program at UNC-Chapel Hill would follow a third organizational model to offer the program within a college of arts and sciences alongside a BA in economics. It would be the only BS in economics degree program in the UNC System offered within a college of arts and sciences. This is noteworthy because BS degrees in economics offered in business schools often have different course requirements than those offered in colleges of arts and sciences. In addition, the proposed degree program is distinct because of its relationship to other departments at UNC-Chapel Hill. Compared to the existing BA degree, the proposed BS degree program will require more classes in the departments of mathematics, statistics and operations research, and computer science.
- 5. Employment Opportunities for Graduates.** Nationwide job prospects for economists are strong. According to the Bureau of Labor Statistics (BLS), the employment of economists is projected to increase nationally by 6% from 2016 to 2026. Due to the increase in the use of data and market research across all industries, the BLS expects job opportunities to be best for economists with strong quantitative and analytical skills, as well as those with experience using statistical software. For instance, market research analyst positions, which typically require strong math and statistical skills, are projected to grow by 23% from 2016 to 2026 (BLS). In addition, the occupations projected to grow the fastest between 2016 and 2026 include statisticians (rank seven) and mathematicians (rank 10).

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- 6. Faculty Quality and Number.** No new faculty will be needed to support the proposed degree program. The courses required for a BS in economics are already offered for the existing BA in economics.
- 7. Availability of Campus Resources (library, space, etc.)** The R. B. House Undergraduate Library's holdings are adequate to support the proposed degree program. The available texts, academic journals, and data resources that are used by current economics BA students are also sufficient for the proposed economics BS students.

The facilities are adequate to support the proposed degree program. Economics BS students will take current economics department classes, many of which are held in the department's home building of Gardner Hall. The economics department offers classes that vary greatly in size, and in response it uses classrooms throughout campus that fit the classes' capacity needs. It is anticipated that the proposed degree program will have minor impacts on class sizes, and these can be accommodated through normal matching of courses to rooms on campus.

- 8. Relevant Lower-level and Cognate Programs.** The proposed degree program would not be associated with or supported by any lower-level or cognate programs. It would require students to take six related courses outside of the economics department. These courses already exist at UNC-Chapel Hill, and in their current form are well-matched to the curriculum for a BS in economics. Therefore, no improvements or additional courses are needed outside of the economics department.
- 9. Impact on Access and Affordability.** No tuition differential will be sought to support the proposed degree program.

Tuition and fees for spring 2020 are as follows:

Full-Time Undergraduate Tuition and Fees Annualized (In Dollars)

	Resident	Non-Resident
Tuition	7,019	34,198
Fees	1,731	1,731
Total Tuition and Fees	8,750	3,929

- 10. Expected Quality.** The success of the program will be judged by evaluating enrollment, student proficiency in learning outcomes, retention and graduation rates, job placement, and the satisfaction of graduates and employers.
- 11. Feasibility of Collaborative Program.** The proposed degree program was designed to be completed at UNC-Chapel Hill. It follows the conventional model for majors on the UNC-Chapel campus. The main opportunities for collaboration with other institutions will be through transfer students who may satisfy some of the curricular requirements prior to enrolling at UNC-Chapel Hill. Many of the courses can be completed at other institutions, including the required introductory and intermediate courses in economic theory, plus all required mathematics and statistics courses.

12. **Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed by the UNC-Chapel Hill faculty, department and university curriculum committees, the provost, and chancellor. Approval was obtained at all levels.

UNC System Office Review Process and Feedback. Throughout the review process, UNC-Chapel Hill provided relevant information pertaining to program requirements and resources. The institution submitted appropriate documentation and research to support its statements. Reviewers evaluated the proposal and requests for information were provided by the institution.

IV. Recommendation

It is recommended that the Board of Governors approve UNC-Chapel Hill's request to establish a Bachelor of Science in Economics degree program (CIP 45.0603) to enroll students starting fall 2020.

**Request for Authorization to Establish a
Bachelor of Science in Data Science
(BS, CIP 11.0701) at
University of North Carolina at Charlotte**

I. Program Highlights

- The University of North Carolina at Charlotte’s proposed Bachelor of Science in Data Science degree program would prepare students to operate data analysis systems, prepare data for analysis, and visualize information. Their competencies would include data management, mathematical/computational/statistical foundations, visualization, modeling and assessment, workflow and reproducibility, communication and teamwork, domain specific considerations, and ethical problem solving. The benefits of the proposed degree program to graduates include salaries above the national median for earnings and high job demand at the state and national level.
- The proposed degree program would require 120 total credit hours. The curriculum would include general education (37-41 credit hours), major courses (55 credit hours, 15 of which meet general education requirements), and free electives (39-43 credit hours). A capstone project will also be required.
- The proposed degree program would be administered on campus and online (maximum 60 percent online).
- Fifty full-time students are projected in the first year. Three hundred and eighty full-time students are projected by the fourth year.
- No tuition differential will be requested.
- No new faculty will be needed to initiate the proposed degree program. As student enrollment grows, two additional faculty positions may be redistributed through joint appointments between the UNC Charlotte School of Data Science and a college by the Provost.
- The library’s resources are adequate to support the proposed degree program.
- The facilities are adequate to support the proposed degree program.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

- 1. Existing Programs (Number, Location, Mode of Delivery).** There are no public or private institutions in North Carolina that offer a bachelor’s degree in data science. According to Data Science Programs, an online enrollment organization, there are at least 35 BS programs in data science offered at 30 universities across the United States.
- 2. Relation to Campus Distinctiveness and Mission.** The proposed degree program aligns with UNC Charlotte’s mission, including social mobility, public policy, and urban analytics. It would also help fulfill the mission of the University of North Carolina system, “to discover, create, transmit, and apply knowledge to address the needs of individuals and society.”
- 3. Demand (local, regional, state).** UNC Charlotte commissioned a report from EAB (formerly the Education Advisory Board) on the job market for undergraduate data science graduates in North Carolina. Between the second half of 2013 and the first half of 2017, the number of positions posted in North Carolina that specifically required a bachelors’ in data science grew by 76

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percent, and in the Charlotte region the growth was 109 percent. More broadly, positions that mention competencies developed in a BS in data science grew from 2,337 to 4,777 in 2019. Similar information is conveyed in the IT Job Trends reports gathered by NC Tech Association.

- 4. Potential for Unnecessary Duplication.** The proposed degree program would be the first undergraduate degree in data science in North Carolina. While there are programs in management information systems, statistics and analytics, and business analytics, the target skills in these areas are different enough not to be considered as similar. The difference is that programs in data science prepare graduates to design and construct new processes for data modeling and production, while data analytics and related programs prepare graduates to identify trends and prepare presentations to stakeholders.
- 5. Employment Opportunities for Graduates.** According to LinkedIn's 2019 *Emerging Jobs Report*, one of the 15 fastest growing jobs in the United States is data scientist, with 37% projected annual growth. The field of data science made the report's list of the top 15 jobs for the last three years. In addition, a 2017 study by Burning Glass, IBM, and the Business Higher Education Forum indicated a rapid transformation across almost all industry clusters (and government and non-profit as well) as firms and organizations respond to the realities of 'big data.' In 2016 alone, the number of jobs specifically advertised for data science grew by 54%, and there was a corresponding growth in the number of postings for positions related to data science. The report predicted that 364,000 new data science positions would be created by 2020.
- 6. Faculty Quality and Number.** No new faculty will be needed to initiate the proposed degree program. As student enrollment grows, two additional faculty positions may be redistributed through joint appointments between the UNC Charlotte School of Data Science and a college by the Provost.
- 7. Availability of Campus Resources (library, space, etc.)** The resources of the Atkins Library are adequate to support the proposed degree program. The library has an expansive set of databases that cover the subject of data science, including: ACM Digital Library, Compendex, IEEE Xplore, Inspec, Science Citation, Index, Science Direct, Synthesis Digital Library of Engineering and Computer Science (Morgan and Claypool), and Web of Science.

The facilities of the Bioinformatics Building at UNC Charlotte are adequate to support the proposed degree program. All faculty have private offices, conference rooms, and workspace through the College of Computing and Informatics, the College of Liberal Arts and Sciences, the College of Health and Human Services, and the Belk College of Business. Depending upon program growth, additional faculty offices may be required.

- 8. Relevant Lower-level and Cognate Programs.** Given the interdisciplinary curriculum, the proposed degree program would be supported by coursework in the computer science, software and information systems, and mathematics and statistics departments. Joint faculty with Business Information Systems and Operations Management (BISOM), management, public policy, criminal justice, sociology, and organizational science will also support the proposed degree program. In addition, a partnership with the Institute for Social Capital will provide support through guidance on the social impact of information.

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- 9. Impact on Access and Affordability.** No tuition differential will be sought to support the proposed degree program.

Tuition and fees for spring 2020 are as follows:

Full-Time Undergraduate Tuition and Fees Annualized (In Dollars)

	Resident	Non-Resident
Tuition	3,812	17,246
Fees	3,093	3,093
Total Tuition and Fees	6,905	20,339

- 10. Expected Quality.** The success of the program will be judged by evaluating enrollment, student proficiency in learning outcomes, retention and graduation rates, job placement, and the satisfaction of graduates and employers.
- 11. Feasibility of Collaborative Program.** While there are no BS in data science degrees offered in UNC System institutions, UNC Charlotte participates in the National Consortium on Data Science that is managed by the Renaissance Computing Institute (RENCI) at UNC-Chapel Hill. Most data science and analytics university programs in North Carolina are members or participate in this Consortium (North Carolina State University, UNC Charlotte, the University of North Carolina at Greensboro, and UNC-Chapel Hill). In recent years, UNC Charlotte's School of Data Science has collaborated with UNC Greensboro in the recent launch of their MS in informatics and analytics. UNC Charlotte expects to continue and expand these collaborations.
- 12. Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed by the UNC Charlotte's faculty, department and university curriculum committees, the provost, and chancellor. Approval was obtained at all levels.

UNC System Office Review Process and Feedback. Throughout the review process, UNC Charlotte provided relevant information pertaining to program requirements and resources. The institution submitted appropriate documentation and research to support its statements. Reviewers evaluated the proposal and requests for information were provided by the institution.

IV. Recommendation

It is recommended that the Board of Governors approve UNC Charlotte's request to establish a Bachelor of Science in Data Science degree program (CIP 11.0701) to enroll students starting fall 2020.

**Request for Authorization to Establish a
Master of Science in Computer Engineering
(MS, CIP 14.0901) at
University of North Carolina at Charlotte**

I. Program Highlights

- The University of North Carolina at Charlotte’s proposed Master of Science in Computer Engineering degree program would prepare students for careers in computer engineering, with an emphasis on competency in computer architecture and hardware design, computer systems and applications software, and distributed and real-time computer systems. The benefits to graduates of the proposed degree program include salaries above the national median for earnings and high job growth at the state and national level.
- The proposed degree program would require 30 total credit hours. In the thesis option, students must complete nine credit hours of thesis research and 21 credit hours of coursework. Students in the non-thesis option must complete 30 credit hours of coursework or 27 credit hours of coursework along with three credits of individualized project work.
- The proposed degree program would be administered on campus.
- Eighty full-time students and 10 part-time students are projected in the first year. Ninety-eight full-time students and 20 part-time students are projected by the fourth year.
- Enrollment increase funds will be requested through the yearly budget review process conducted by the college and academic affairs. These funds, if available, would be used to hire additional faculty in computer engineering to support additional teaching and research.
- A tuition differential of \$110 per credit hour for each semester will be sought to support the proposed degree program. This amount is consistent with all other graduate students in the College of Engineering (COE) at UNC Charlotte. The revenue would support graduate assistantships and maintain research laboratories in the COE.
- No new faculty will be needed to initiate the proposed degree program. As student enrollment grows, additional faculty positions may be requested.
- The library’s resources are adequate to support the proposed degree program.
- The facilities are adequate to support the proposed degree program.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

1. **Existing Programs (Number, Location, Mode of Delivery).** One institution in the University of North Carolina System offers a master’s program in computer engineering, North Carolina State University. North Carolina Agricultural and Technical State University has a master’s in electrical engineering with a concentration in computer engineering. Duke University offers a master’s program in electrical and computer engineering.
2. **Relation to Campus Distinctiveness and Mission.** The proposed degree program aligns with UNC Charlotte’s mission to offer internationally competitive programs of research and creative activity, and exemplary undergraduate, graduate, and professional programs. It is consistent with the mission of the University of North Carolina system, “to discover, create, transmit, and apply knowledge to address the needs of individuals and society.” In addition, it supports the UNC System’s Strategic Plan to increase the critical workforce in high-demand STEM fields.

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- 3. Demand (local, regional, state).** According to the Charlotte Chamber of Commerce, more than 44,000 people work in technology occupations in the Charlotte region. From 2006 to 2016, technology-based employment in Charlotte increased by 62 percent. From 2014 to 2016, Charlotte was recognized as one of the fastest growing cities in terms of technology in the nation with an 18 percent increase in jobs. This 10-year growth in technology employment in the metro area includes a 23 percent increase in the number of workers in STEM occupations that are heavily populated by computer engineering professionals nationwide. In the past ten years, the region has added 7,400 jobs in two key high-tech business services sectors: custom programming and systems design services, along with nearly 700 percent growth in software publishing employment.
- 4. Potential for Unnecessary Duplication.** NC State University offers a master's program in computer engineering and North Carolina A&T State University offers a master's degree in electrical engineering with a concentration in computer engineering. However, there are no other MS programs in computer engineering in the western part of North Carolina that can meet the needs of the rapidly growing tech industry in the region. In addition, the proposed degree program will be offered in-person only, therefore it is not expected to have a significant impact on NC State University's online engineering program.
- 5. Employment Opportunities for Graduates.** According to the U.S. Bureau of Labor Statistics (BLS), employment of software developers is projected to grow 24 percent from 2016 to 2026, much faster than the average for all occupations. Employment of applications developers is projected to grow 30 percent, and employment of systems developers is projected to grow 11 percent. Employment of computer hardware engineers is projected to grow five percent from 2016 to 2026, near the average of seven percent for all occupations.
- 6. Faculty Quality and Number.** No new faculty will be needed to initiate the proposed degree program. All courses are currently included in the existing electrical and computer engineering curriculum. Therefore, the teaching responsibilities for the proposed degree program will be absorbed in whole by the present faculty. As student enrollment grows, additional faculty positions may be requested.
- 7. Availability of Campus Resources (library, space, etc.)** The resources of the Atkins Library are adequate to support the proposed degree program. Students would have access to relevant databases including *Compendex*, *Inspec*, *Web of Science*, *IEEEExplore*, *ScienceDirect*, *ACM Digital Library*, *Computer and Information Systems Abstracts* and many others. The library owns hundreds of thousands of e-books from Springer, Wiley, Elsevier, Cambridge and other publishers, mostly science and engineering subject matter, in addition to a growing print collection.

The facilities of the computer systems labs (Edge Computing Lab, CyberPhysical Systems Lab, Wireless Communications and Networking Lab, Embedded Systems and Robotics Lab, Reconfigurable Systems Lab, and the Computer Vision Lab) at UNC Charlotte are adequate to support the proposed degree program.

- 8. Relevant Lower-level and Cognate Programs.** Students admitted to the proposed degree program would be required to have all lower-level coursework and academic preparation

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necessary for success in the curriculum. No supporting lower-level programs or cognate programs are required to support the proposed program.

- 9. Impact on Access and Affordability.** A tuition differential of \$110 per credit hour for each semester will be sought to support the proposed degree program. This amount is consistent with all other graduate students in the College of Engineering (COE) at UNC Charlotte. The revenue would support graduate assistantships and maintain research laboratories in the COE.

Tuition and fees for spring 2020 are as follows:

Full-Time Graduate Tuition and Fees Annualized (In Dollars)

	Resident	Non-Resident
Tuition	4,337	17,771
Fees	3,093	3,093
Differential Tuition	1,800	1,800
Total Tuition and Fees	9,230	22,664

- 10. Expected Quality.** The success of the program will be judged by evaluating enrollment, student proficiency in learning outcomes, retention and graduation rates, job placement, and the satisfaction of graduates and employers.

- 11. Feasibility of Collaborative Program.** The proposed degree program and the existing computer engineering program at NC State University have the potential for mutual benefit. UNC Charlotte students could take a limited number of online courses from NC State University. In addition, graduates from the proposed degree program could add to the pool of potential PhD applicants for NC State University's program in computer engineering. Faculty from both institutions who teach computer engineering could collaboratively teach similar courses.

- 12. Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed by the UNC Charlotte's faculty, department and university curriculum committees, the provost, and chancellor. Approval was obtained at all levels.

UNC System Office Review Process and Feedback. Throughout the review process, UNC Charlotte provided relevant information pertaining to program requirements and resources. The institution submitted appropriate documentation and research to support its statements. Reviewers evaluated the proposal and requests for information were provided by the institution.

IV. Recommendation

It is recommended that the Board of Governors approve UNC Charlotte's request to establish a Master of Science in Computer Engineering degree program (CIP 14.0901) to enroll students starting fall 2020.