## Council Approval

Note: This form is intended to track the progress of a proposal (whether from Academic Affairs or Health Sciences) through the Undergraduate and Graduate Councils.

Proposal: Graduate Certificate in Statistics

This proposal needs to go through:
Undergraduate Council
Graduate Council X
Both Approvals Grad Approval/Undergrad Notification

This proposal has been approved by:

Chair of Undergraduate Council $\qquad$ Date: $\qquad$
Chair of Graduate Council
 Date: $11 / 30 / 17$

Once the appropriate signatures) have been obtained, please forward this completed form to the Office of the Senior Vice President for Academic Affairs. (NOTE: The SVP-AlA is the Chief Academic Office for the University of Utah and reports to the Board of Regents in this capacity: When necessary, the (AO will get a signature from the SV'P-HISC.)


Once the Chief Academic Officer's signature has been obtained, this approval document will be forwarded to the Office of the Academic Senate.

# Utah System of Higher Education <br> New Academic Program Proposal <br> Cover/Signature Page - Abbreviated Template 

| Institution Submitting Request: | University of Utah |  |
| :--- | :--- | :--- |
| Proposed Program Title: | Graduate Certificate in Statistics |  |
| Sponsoring School, College, or Division: | Graduate School |  |
| Sponsoring Academic Department(s) or Unit(s): | University Statistics Committee |  |
| Classification of Instructional Program Code ${ }^{1}:$ | 27.0501 |  |
| Min/Max Credit Hours Required of Full Program: | 15 | 115 |
| Proposed Beginning Term²: | Fall | 2018 |
| Institutional Board of Trustees' Approval Date: |  |  |

## Program Type:

| $\square$ | Certificate of Proficiency $\square$ Entry-level CTE CP <br> Certificate of Completion  <br> Minor  <br> Graduate Certificate  <br> K-12 Endorsement Program  |  | $\square$ Mid-level CP |  |
| :---: | :---: | :---: | :---: | :---: |
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|  |  |  |  |  |
|  | NEW Emphasis for Regent-Approved Program |  |  |  |
|  | Credit Hours for NEW Emphasis Only: | Min Cr Hr | / Max Cr Hr |  |
|  | Current Major CIP: | 6 - Digit CIP |  |  |
|  | Current Program Title: |  |  |  |
|  | Current Program BOR Approval Date: |  |  |  |
| $\square$ | Out of Service Area Delivery Program |  |  |  |

Chief Academic Officer (or Designee) Signature:
I, the Chief Academic Officer or Designee, certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Please type your first and last name Date: <br> I understand that checking this box constitutes my legal signature.}

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# Proposal for a Graduate Certificate in Statistics 

University Statistics Committee<br>University of Utah

Michael K. Gardner, Chair

Background. The University Statistics Committee is an interdepartmental group that oversees the Masters of Statistics degree. Five "tracks" exist: Biostatistics (in Family and Preventive Medicine), Econometrics (in Economics), Educational Psychology, Mathematics, and Sociology. Students are admitted to the home department, and degrees are granted in the home department. Courses offerings include curriculum in each participating department as well as a number of classes taught under the STAT prefix by the Masters of Statistics program. Currently there are between 70 and 80 students enrolled in the Masters of Statistics program.

While the Masters of Statistics degree is highly valued in the job market, many students from applied disciplines shy away from the degree because of the foundational mathematics courses required (MATH 5010, 5080, and 5090) and the requirement of a thesis-like project. The University Statistics Committee feels that it could provide training to a wider audience of graduate students by offering a Graduate Certificate in Statistics. This would demonstrate knowledge of more applied statistical techniques, and likely make students more marketable post graduate degree.

Design of the Certificate. Our vision for the Graduate Certificate in Statistics is as follows: students would take 15 credits of graduate level coursework in statistics. This would be divided between 9 credits from within the track (e.g., home department), and 6 credits from the University Statistics Committee. Three of the five existing tracks have expressed an interest: Biostatistics, Econometrics, and Educational Psychology. We anticipate that other tracks may be added as well; we are currently in talks with the Dean of Social and Behavioral Sciences about an additional track or tracks within that College). The University Statistics Committee encourages departments with an interest in statistics to join the Committee and propose offerings. In the past, this has been limited to the Masters of Statistics degree; however, in the future we foresee departments joining for either the Masters of Statistics degree or the Graduate Certificate in Statistics.

We anticipate that graduate students will apply for admission to the track they choose prior to taking more than 9 credits in the certificate curriculum. The reason for having students apply to the track is to give departments control over potential resource issues. If a department feels it cannot offer new sections of a course, or must limit enrollment for other reasons, the track (e.g., department) will have the ability to not admit students to the certificate. Without this mechanism, many departments would be uneasy participating in the certificate program. Admission criteria would be determined by each track, which is how admission to the Masters of Statistics degree works currently.

Attached to the end of this document are proposed curricula for the three currently participating tracks. We anticipate that the University Statistics Committee will create a set of three to four additional courses, so that students could complete the STAT credits by taking at least one STAT numbered course during any semester.

Resource Issues. All faculty who teach in the Masters of Statistics program are housed within home departments, thus the program does not have faculty salary line costs, per se. However, in order to teach the additional statistics courses required for the certificate, the University would need add $\$ 12,000$ per year to the program for two additional courses per year. At this point, the program teaches one STAT course per year. The additional funding would allow the program to teach three courses per year, one each semester (Fall, Spring, and Summer). These courses would be taught either by adjunct faculty or regular faculty teaching on an overload basis. The actual courses taught would rotate.

Benefits and Costs. The proposed certificate would benefit a wider range of the graduate student community by providing them with quantitative skills that are valued by employers. This would likely lead to higher income jobs upon graduation. US News \& World Report listed statistician as the \#4 best job in the US in their latest survey (http://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs ). The Department of Labor lists median pay in 2015 for statisticians (at the masters level) as $\$ 80,110$, with employment growth of $34 \%$ over the ten years from 2014 to 2024, which is much faster than average (https://www.bls.gov/ooh/math/statisticians.htm ).

Courses proposed for the certificate by the tracks are already being taught (though enrollment would need to be controlled by the admissions policy). Additional courses being added by the University Statistics Committee would require funding via the Dean of the Graduate School and the Senior Vice President for Academic Affairs, as stated above.

# Graduate Certificate in Statistics 

Department of Family and Preventive Medicine Public Health/Biostatistics

## Departmental Statistics Courses

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Nine Credits from the Following:
FP MD 6106: Categorical Data Analysis (3 credits)
FP MD 6307-008: Biostatistics Seminar (1 credit)
FP MD 7100: Biostatistics II (3 credits)
FP MD 7120: Linear and Logistic Regression Models (3 credits)
FP MD 7130: Longitudinal Data Analysis (3 credits)
FP MD 7300: Epidemiology II (3 credits)
```


## Statistics Electives

Two of the Following:
STAT 6003: Survey of Statistical Packages (3 credits)
STAT 6969: Bayesian Methods (3 credits)
STAT 6969: Computational Statistics (3 credits)
STAT 6969: Statistics in Epidemiology (3 credits)
STAT 6769: Introduction to Hierarchical Linear Modeling (3 credits)

# Graduate Certificate in Statistics 

## Economics

## Departmental Statistics Courses

One of the Following:
ECON 6630: Applied Econometrics (3 credits)
ECON 7590: Econometrics (3 credits)
Plus Both of the Following:
ECON 7800: Econometrics I (3 credits)
ECON 7801: Econometrics II (3 credits)

## Statistics Electives

Two of the Following:
STAT 6003: Survey of Statistical Packages (3 credits)
STAT 6969: Bayesian Methods (3 credits)
STAT 6969: Computational Statistics (3 credits)
STAT 6969: Statistics in Epidemiology (3 credits)
STAT 6769: Introduction to Hierarchical Linear Modeling (3 credits)

# Graduate Certificate in Statistics 

## Educational Psychology

## Departmental Statistics Courses

ED PS 7020: Quantitative Methods II (6 credits; prerequisite ED PS 7010)
Plus One of the Following:
ED PS 7300: Psychometric Theory (3 credits)
ED PS 7400: Advanced Research Design (3 credits)
ED PS 7570: Multivariate Statistics (3 credits)
PSY 6550: Structural Modeling (3 credits)

## Statistics Electives

Two of the Following:
STAT 6003: Survey of Statistical Packages (3 credits)
STAT 6969: Bayesian Methods (3 credits)
STAT 6969: Computational Statistics (3 credits)
STAT 6969: Statistics in Epidemiology (3 credits)
STAT 6769: Introduction to Hierarchical Linear Modeling (3 credits)

Septemiber 12,2017
Michael Gardner, PhD
Chair, University Statistics Committee
Department of Educational Psychology
College of Education
University of Utah
Salt Lake City UT 84112
Dear Dr. Gardner:
This is to express our enthusiastic support of the Statistics Certificate Program that has been proposed by the interdepartmental University Statistics Committee, for which the Public Health Division of this department administers the MSTAT/Biostatistics Track.

Such a certificate would be attractive to both Masters- and PhD-students in public health, as it provides a credential in statistics that is less time-intensive to obtain than the MSTAT degree.

We understand that it would be administered by the University Statistics Committee, including our Public Health Division's MSTAT/Biostatistics Track faculty. Students would be required to apply for a track-specific certificate and be recommended for admission by the track faculty.

Please let us know how we can help to expedite the approval of this certificate program.

stephen Alder. PhD
Chief, Division of Public Health
and Vice-Chair, Department of Family and Preventive Medicine steve.alder@hsc.utah.edu


Kolawole S. Okuyemi, MiD, MPH
Chair, Department of Family and Preventive Medicine
Kola.okuyemi@hsc.utah.edu

In the Public Heallh track of the Statistics certificate program, students would take:

| Credits | Departmental courses |
| :---: | :---: |
| 9 | Select 9 credits from: <br> FPMD 7100: Biostatlstics II <br> FPMD 7300 Epidemiology II <br> FPMD-6307-8:-Blo"statistics seminar <br> FPMD 6106: Categorical Data/ Causal Methods <br> FPMD 6107: Survival Analysis <br> FPMD 7120: Linear/Logistlc Regression <br> FPMD 7130: Longitudinal Data Analysls |
|  | STAT courses |
| 6 | Select 6 credits from: <br> STAT 6003: Survey of Statistical software <br> STAT 6969: Bayeslan Methods <br> STAT6969: Computational Methods <br> STAT 6969: Statistics in Epidemiology <br> STAT 6769: Hierarchical Linear Models |
| 15 | Total credits |

April 8, 2017

Professor Michael Gardner<br>Chair, University Statistics Committee<br>University of Utah

## Professor Gardner:

I am writing to support the Proposal for a Graduate Certificate in Statistics which has been developed by the University Statistics Committee. There is growing demand for statistical analysis skills across our campus. While the Master of Statistics program provides excellent training, it is important for the university to develop ways for students already engaged in other demanding graduate programs to acquire, and certify, statistical training relevant to their field. The Graduate Certificate proposal will do that by allowing students to combine statistics courses from their home program with STAT courses in a rigorous but manageable 15 -hour certificate. I expect that many graduate students in economics will take advantage of this certificate. We will certainly encourage them to.

Regards,


Thomas N. Maloney Professor and Chair

Department of Educational Psychology
April 3, 2017
To the University Curriculum Committee:
I am writing in my capacity as Department Chair to express support for the University Statistics Committee's proposal for a Graduate Certificate in Statistics. I am very familiar with this program, as I have served as both Educational Psychology Track Representative and Chair of the University Statistics Committee. I was also involved in early discussions of the potential benefits of such a certificate.

Because the University of Utah does not offer minors for individuals in doctoral programs, the specific expertise gained by a student in these programs is not always clear. In Educational Psychology, most of our doctoral students already take several of the courses in the proposed certificate program, but their statistical expertise is not documented anywhere on their transcript. As the job market for graduating PhDs becomes tighter, particularly in academia, the ability to demonstrate specialized expertise (such as in statistics), becomes increasingly important. Given that statistician has been recently named by U.S. News and World Report as the \#4 best job in the country, the ability to document expertise in this area could be especially beneficial.

In many of the disciplinary tracks of the Masters in Statistics program, the required courses overlap with curriculum for programs within the home department. For example, within Educational Psychology, the courses required for the MStat degree are also requirements for multiple PhD programs within the department. Thus, the MStat courses do not place additional instructional burden on the department; instead, they bring additional students to courses that are already being offered. The proposed graduate certificate in statistics would have essentially the same impact within each home department - more student credit hours for little to no additional instructional costs. I believe the certificate would attract more students to statistics courses without placing significant additional burden on the instructors or the MStat program.

In summary, the proposal for the graduate certificate in statistics has my strong support. It will help bolster enrollment in classes within each track, as well as those offered by the MStat program, and it will increase the number of students across campus with expertise in statistics.

Sincerely,


Professor and Chair
Educational Psychology Department

OF UlA

To the University Statistics Committee:
As Dean of the Graduate School, I am writing to express my support for the proposed Graduate Certificate in Statistics. Michael Gardner, the Chair of the University Statistics Committee (which oversees the University's interdepartmental Masters of Statistics degree), has described the proposed certificate to me, and I believe this certificate will bring important quantitative skills to a much wider audience of graduate students than the more intensive Masters of Statistics degree is able to do. These quantitative skills are in high demand in the job market, and will likely improve both the employability and salaries students who receive the certificate.

Dr. Gardner and I have discussed the certificate with Senior VP Watkins, and we have reached consensus to strongly support this initiative. As part of this support, the Graduate School will commit three years of additional support to the MSTAT program at a level of $\$ 12,000$ per year funds to help teach the additional courses that will be required to implement the Graduate Certificate in Statistics. With this support in place, we believe the MSTAT program will have sufficient resources to carry out the development and initial operational phases of the certificate program. We anticipate reviewing this level of support after the initial three-year period, with a goal of ensuring long-term sustainability of the program.

If you have any other questions, please feel free to contact me.

Sincerely,


David Kieda
Dean of the Graduate School

## The Graduate School 302 Park Building


[^0]:    ${ }^{1}$ For CIP code classifications, please see ${ }^{\text {http:///nces.ed.gov/ipeds/cipcode/Default.aspxyy=55. }}$
    2 "Proposed Beginning Term" refers to first term after Regent approval that students may declare this program.

