

THE UNIVERSITY OF MARYLAND, COLLEGE PARK PROGRAM/CURRICULUM PROPOSAL

DIRECTIONS:

- Provide one form with original approval signatures in lines 1 - 4 for each proposed action. Keep this form to one page in length.
- Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
- Please submit the signed form to Claudia Rector, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED ___ Fall 2007

PCC LOG NO.

07041

COLLEGE/SCHOOL ___ CMPS

DEPARTMENT/PROGRAM ___ MATH/AMSC

PROPOSED ACTION (A separate form for each) ADD X DELETE _____ CHANGE ___

DESCRIPTION: Initiating a new Applied Statistics Area of Specialization within the Applied Math and Scientific Computing Program, with admissions requirements; course requirements; examination requirements; and evaluation criteria for candidacy modified from those of the standard Applied Math and Scientific Computing Area of Specialization.

JUSTIFICATION/REASONS/RESOURCES: Although AMSC students can pursue an applied statistics path within the existing AMSC framework, the creation of an applied statistics Area of Specialization will offer several advantages:

1) It will attract mathematically trained students entering graduate school with specific interests in applied statistics. For lack of a defined formal degree program in applied statistics, many such students would not decide to come to University of Maryland College Park: a degree labeled Statistics is necessary to meet many of their likely career goals, and some areas of statistics (for example, methodology of statistical computing) fall outside the existing programs on campus.

2) A targeted program in applied statistics can emphasize, through its requirements and candidacy evaluation criteria, can emphasize training in skills (technical writing, graphics of data display, statistical computation) uniformly necessary for the modern applied statistician but currently left to the initiative of individual AMSC (or other subject-matter department) thesis advisors and students.

3) Faculty in various units on campus may find this new track more appealing than the current AMSC offerings because it will allow them to attract and advise students with a stronger interest in the theory underlying current statistical practice.

4) Establishment of this new track in applied statistics should lead to increased awareness and visibility among both faculty and students of the extensive expertise and educational opportunities in statistics that exist on our campus.

NEW RESOURCES NEEDED FOR PROPOSED AMSC APPLIED STATISTICS SPECIALIZATION:

- Augmentation of the AMSC Program's staff for administrative support of additional advising and coordination of the program functions.
- Resources for running the core courses in agreement with cross departmental partners of the AMSC Statistics program.
- Faculty resources to support teaching and creation of additional new courses that are relevant to the new specialization.

APPROVAL SIGNATURES

	DATE
1. Department Committee Chair <u>[Signature]</u>	<u>10/17/07</u>
2. Department Chair <u>[Signature]</u>	<u>James A Yorke</u>
3. College/School PCC Chair <u>[Signature]</u>	<u>November 5, 2007</u>
4. Dean <u>[Signature]</u>	<u>November 5, 2007</u>
5. Dean of the Graduate School (if required) <u>[Signature]</u>	<u>5/8/08</u>
6. Chair, Senate PCC <u>[Signature]</u>	<u>5/2/08</u>
7. Chair of Senate _____	
8. Vice President for Academic Affairs & Provost <u>[Signature]</u>	<u>5/5/08</u>

Creation of an Area of Specialization in Applied Statistics within the Applied Mathematics and Scientific Computation (AMSC) Program

I. OVERVIEW OF PROPOSAL

This is a proposal to change the name of the **Applied Mathematics and Scientific Computation** M.S. and Ph.D. degree programs and to create within them an Area of Specialization in Applied Statistics leading to the M.S. and Ph.D. degrees. The proposed changes are as follows:

A. The name of the approved M.S. and Ph.D. degree programs in Applied Mathematics and Scientific Computation will be changed to: *Applied Mathematics and Statistics and Scientific Computation*.

B. Complete tracks in Applied Statistics leading to AMSC MS and PhD degrees are proposed, which differ in their requirements from the degrees with Statistics specialization obtainable within the current AMSC program. The differences are:

- (i) required core Statistics courses, which for both M.S. and Ph.D. must be courses from a designated list or their equivalents;
- (ii) the addition of a required 3-credit one-semester *Practicum* project for the PhD;
- (iii) an altered comprehensive examination structure, for the PhD and the MS without thesis, consisting of two written examinations plus a required independent two-week intensive Data Analysis Project structured as a 1-credit course; and
- (iv) altered guidelines for students in the Applied Statistics Area, which specifically emphasize skills in data analysis and presentation skills, including proficiency in the oral and written presentation of data-analytic results.

C. The AMSC governing structure will be augmented to include a faculty Committee to create and evaluate the required Data Project component of the comprehensive examinations, and an agreement that the instructor of the most recently offered core Multivariate Statistics course to be given each January and August.

II. RATIONALE

Although AMSC students can currently pursue an applied statistics path within the existing AMSC framework, the creation of an Applied Statistics Area of Specialization (a term used interchangeably in this Proposal with “Applied Statistics Track”) will offer several advantages:

- 1) It will attract mathematically trained students entering graduate school with specific interests in applied statistics.
- 2) A targeted track in applied statistics can emphasize, through its requirements and candidacy evaluation criteria, necessary skills (design and collection of data, process of data analysis, statistical computation and simulation experience in applying statistical tools to real data, technical writing, and graphics of data display) for the modern applied statistician but currently left to the initiative of individual AMSC (or other subject-matter department) students and thesis advisors.
- 3) A Practicum involving students in projects at agencies or scientific laboratories — to be run in cooperation with a newly proposed campus Graduate Internship Program in Statistics to be administered by the Campus Statistics Consortium — will provide students with practical experience in data analysis not currently available in most campus programs with an applied statistics component.
- 4) Establishment of this new Area of Specialization in applied statistics should lead to increased awareness and visibility among both faculty and students of the extensive expertise and educational opportunities in statistics that exist on our campus.

The existence of an applied statistics Area would likely enhance future NRC rankings of campus graduate programs in statistics. The existence of many smaller programs including statistics has led to an incorrect outside perception of lack of critical mass in statistics here at College Park. Enhancing the visibility of campus-wide statistical activity on our campus should be instrumental in improving our rankings in the NRC survey.

Graduates of the new Area will be highly marketable. They will be very well qualified for federal and research laboratory positions in applied statistics, as well as for academic positions in many different disciplines, since faculty who are knowledgeable both in statistics and in an area of application are in high and growing demand, as evidenced by recently developed initiatives, both of the NSF and the National Institutes of Health, to increase the number of individuals with cross-disciplinary training.

A. RELATIONSHIP TO EXISTING PROGRAMS

The Applied Statistics Area of Specialization in AMSC will be substantively different from existing programs on campus. The discipline of statistics can vary from development of abstract theory to the fairly practical aspects of applying methods to the analysis and interpretation of a set of data. The existing Statistics Program (STAT) housed in the Mathematics department emphasizes theory including advanced courses that require proficiency in real analysis including Lebesgue measure theory. The students in this mathematically oriented Statistics

program do not ordinarily receive advanced training in an area of application. There are existing degree programs on campus that emphasize applied statistics, for example, programs in business (BMGT) and education (EDMS), but students in these programs do not typically take the advanced courses in statistical theory being emphasized in this new AMSC Area. The Joint Program in Survey Methodology (JPSM), as its name implies, only covers a narrow but important aspect of statistics articulating with social sciences, business, and public policy.

The idea for the Applied Statistics Area of Specialization within AMSC has been discussed widely with statistical AMSC faculty across campus, whose guidance concerning its desirable features has been followed. Letters of support from the campus departments housing statistical methodologists have been solicited and many have been received and attached to this proposal, including letters from all of the departments and programs (MATH, EDMS, BMGT, JPSM, ANSC and ENST [pending]) most directly affected by it.

B. COMMON GROUND BETWEEN AMSC SPECIALIZATIONS

The older Applied Mathematics Area of Specialization has no required courses other than a requirement to take a single course in Numerical Analysis. This reflects the broad interdisciplinary nature of the Program: a core of mathematical courses to be coupled with suitably advanced coursework in an area of application, as approved by a Study Advisory Committee (SAC) and ratified by the Graduate Committee for Applied Mathematics (GCAM). The courses of both types would prepare the student for the written qualifying examinations (or thesis, in case of MS with thesis) and (in the PhD program) for the later candidacy examination to confirm that the student has brought together the necessary tools for research.

The Scientific Computation Area of Specialization requires a core of Scientific Computing and Computer Organization Courses: these courses are the heart of this specialization, and culminate in long projects which serve in lieu of qualifying examinations. However, other courses in the Scientific Computation Area are not specifically required and are subjected to the same tests of intellectual coherence and research relevance, enforced for each student by the student's SAC and the AMSC Program's GCAM.

The new Applied Statistics Area involves a core of required Statistics and Statistical Computing courses, plus required Data Project and Practicum. These courses and project requirements will develop common skills for all Applied Statistics Area students, assessed in the qualifying examinations. These same core courses (but not the Data Analysis Project and Practicum courses, which will be new) have often been chosen as AMSC core and electives by students working in applied probability and statistical topics within the Applied Mathematics Area of Concentration. Coursework beyond these required courses will be approved and ratified by the same structure of SAC and GCAM as in the other two Areas within AMSC.

III. ORGANIZATIONAL CHANGES

The following organizational changes in the re-titled “Applied Mathematics and Statistics and Scientific Computation (AMSC)” degree programs will be made to accommodate the new Area of Specialization in Applied Statistics.

Areas of Specialization

Three Areas of Specialization or Tracks will be available for students in AMSC: the two which exist now, Applied Mathematics as it has existed since the late 1970’s, together with Scientific Computation which was first established in 2000 after being formally approved as an Area of Concentration, plus the new Applied Statistics Area with requirements and administrative structure described in this document.

The new Applied Statistics Area of Specialization will emphasize computational, data-analytic and presentation skills across the broad spectrum of statistical applications, with uniform core requirements in these skills, and less emphasis on formal mathematical theory than in the Mathematical Statistics Program. The Applied Mathematics and Scientific Computation areas will continue in their current forms, including the possibility of degrees involving probability-modeling and statistical topics under the current rubric.

Advising Structure

Advising in the Applied Statistics Area of Specialization, exactly as in the Applied Mathematics Track and Scientific Computation Area of Concentration, will be based on a three-person Study Advisory Committee (SAC) of faculty, formed for each student.

Additional Administrative Structures

The faculty administrative structure of AMSC will continue in its present form, together with one new Data Project Administrative Committee, which will oversee the design, administration and grading of the yearly Data Project portion of the Applied Statistics comprehensive requirements, described more fully below.

Faculty and Administration

The present AMSC program, administered by a Director and elected faculty Graduate Committee, includes at least 15 participating departments and approximately 137 associated faculty. The AMSC Applied Statistics Area will be supervised by those AMSC faculty with an interest in Statistics, broadly defined. It is expected that faculty already on campus with statistical interests will be urged to join the AMSC faculty. In addition, there is an interdisciplinary body of campus faculty – the Statistics Consortium – through which new faculty will be solicited to join. The Consortium will administer the new Graduate Statistics Internship program, which although administratively separate from AMSC will play an important role in the success of the Applied Statistics Area’s Practicum.

New Resources Required

The following resources will be required for the new Applied Statistics Area:

(i) Augmentation of the AMSC Program's staff for administrative support of additional advising and paperwork for the students in the new Area, to coordinate the Practicum, to maintain necessary liaison both with faculty mentors and the administrators of the campus Graduate Statistics Internship programs within the Statistics Consortium, and also to support the additional Data Analysis examination for the Applied Statistics Area. Sufficient resources will be: an addition of 1 graduate student GA FTE Administrative Assistant.

(ii) Resources amounting to roughly 1/4 faculty FTE will be needed to guarantee that STAT 741 and BIOM 602 – existing courses which will become alternative core courses in the Applied Statistics Area – will be offered annually. The guarantee that a second core course – in Multivariate Statistics, initially spread over four possibilities [BMGT 882, EDMS 771, STAT 750, BIOM 621] – will run annually, has required the agreement of cross-departmental partners of the AMSC Statistics Program (MATH, EDMS, BMGT, ANSC, and ENST). See attached letters of support.

(iii) Three new courses are proposed: AMSC 760 Applied Statistics Practicum (3 credits), AMSC 761 Applied Statistics Seminar (1 credit), and AMSC 762 Data Analysis Project (1 credit). Detailed descriptions of these courses are given below, under Section IV.B on Requirements in the Applied Statistics Area. Faculty resources (5 credits per year) covering teaching of these courses are promised in attached letters of support.

No new computing resources will be needed: there are adequate resources in existing computer labs and departmental networks. Adequacy of campus library resources is documented in attached "Assessment Letter" from the Director of Collection Management of the UMCP Libraries, Desider Viktor.

All resources for the new Area of Concentration are in place.

IV. DEGREE REQUIREMENTS UNDER THE NEW AREA

A. Current AMSC Program

The conditions and educational policies governing the AMSC doctorate and MS degrees with and without thesis, both under the standard Applied Mathematics (AM) Area of Concentration and the Scientific Computation (SC) Area of Specialization, are described in detail in the web-pages <http://www.amsc.umd.edu/programs/phd.html> and <http://www.amsc.umd.edu/programs/masters.html>.

Table 1: Credit hours required, by category, in Applied Mathematics (**AppMath**), Scientific Computation (**SciComp**) and Applied Statistics (**AppStat**) Areas, for MS degrees with and without thesis and PhD degrees. ‘AMSC Core’ means MATH, STAT, and AMSC courses. * means not required. Seminars are approved AMSC seminars or Research Interaction Teams.

Degree	Category	AppMath	SciComp	AppStat
MS nonthesis	AMSC Core	14	9	18
	Core Science	*	6	*
	Advanced SC	*	6	*
	Seminar	1	*	2
	Data Project	*	*	1
	Application	6	3	6
	Electives	9	6	6
MS thesis	AMSC Core	11	9	18
	Core Science	*	6	*
	Seminar	1	*	1
	Application	6	3	6
	Electives	6	6	0
	Thesis	6	6	6
PhD	AMSC Core	16	9	18
	Core Science	*	6	*
	Advanced SC	*	6	*
	Seminar	2	*	3
	Data Project	*	*	1
	Practicum	*	*	3
	Application	6	6	6
	Electives	6	9	3
	Thesis	12	12	12

The course, thesis, and seminar credit requirements are summarized in Table 1. For all AM degrees, 3 of the credits in the common core courses must be in a course in numerical analysis. In the AM specialization PhD and MS without-thesis degree programs, students take three written examinations, at least one of which must be in a Mathematics area and at least one in an area of application. For the SC degree specializations, the Examinations requirement is replaced by the mandated performance at average grade 3.5 in the required Scientific Computing courses (SC I & II, and also Advanced SC I & II in the PhD and MS without-thesis programs) and Computer Organization and Programming (COP) course. (In the Table, the AMSC Core for SC programs refers to the combination of the SC I & II and COP courses.)

B. Proposed Applied Statistics Area of Specialization

Credit requirements for the Applied Statistics Area of Specialization in the Ph.D. and M.S. degree programs are displayed in Table 1. The comparison with the older Applied Mathematics and Scientific Computation Areas shows clearly the heavy emphasis the new Area places on core courses and on the Data Analysis Project, Seminar and Practicum requirements. As noted below, because of the highly interdisciplinary aspects of this program, the student's advisory committee may ask students to complete more than the minimum number of credits displayed in Table 1.

Core Statistics Requirements

All masters and doctoral students entering the Applied Statistics Area will need to complete the equivalent of the following 6 course requirements, representing 18 core credits. Complete descriptions of the core courses listed below can be found in the Graduate Catalog.

Mathematical Statistics: Two semesters on statistical inference given by the STAT program.

STAT 700 Mathematical Statistics I (3 credits) Offered only in Fall.

Prerequisite: STAT 410 or equivalent.

Statistical concepts, sampling distributions, and optimality principles.

STAT 701 Mathematical Statistics II (3 credits) Offered only in Spring.

Prerequisite: STAT 700 or equivalent.

Hypothesis testing and optimality concepts; parametric and nonparametric theory and examples; large-sample theory.

Linear models and regression: Two semesters on linear models, the first given only by the STAT program, the second given either by STAT or with BIOM 602 on Experimental Design as an allowed equivalent.

STAT 740 Linear Statistical Models I (3 credits) Offered only in Fall.

Prerequisite: STAT 420 or STAT 700 or equivalent.

Least squares, general linear models, regression, analysis of variance and covariance.

STAT 741 Linear Statistical Models II (3 credits)

Offered only in Spring.

Prerequisite: STAT 740 or equivalent.

Experimental design, random effect and mixed models, and generalized linear models.

Statistical computing: The modern practice of applied statistics requires intensive computing and sophisticated software tools. Students may complete the statistical computing course requirement by taking STAT 705, or by another course approved by the student's SAC which develops statistical computing expertise in high-level statistical packages and includes appropriate simulation techniques (e.g. Monte Carlo and bootstrap methods) and numerical methods.

STAT 705 (formerly STAT 798C) Statistical computing; (3 Credits).

Prerequisite: STAT 420 or STAT 700 or equivalent.

Introduction to statistical computing using **Splus/R** and **SAS** including Monte Carlo simulation techniques and numerical methods (numerical maximization, smoothing and linear algebra).

Multivariate statistics: The required Multivariate Analysis course covers many of the classic topics including discrimination, MANOVA, Hotelling's T-square, Principal Component Analysis, Factor Analysis, and Canonical Correlation. Any of several courses on campus — including STAT 750, EDMS 771, BMGT 882 and BIOM 621 — can meet this requirement.

Other requirements

Practicum: Usually in the third year, doctoral students in the Applied Statistics Area will be required to complete a one-semester Practicum. The goal is to gain experience of statistical research in a real-world setting. After obtaining approval in advance for a Practicum project proposal submitted to the Study Advisory Committee, the student will participate actively in a semester-long applied statistical project, such as an internship or collaborative research assistantship involving more planning and expertise than the smaller projects assigned in a classroom setting. A new three credit AMSC course, detailed below, will formalize this requirement. Students will be encouraged to complete the Practicum off-campus in the setting of a government agency or off-campus commercial or non-profit research organization. One vehicle for arranging such an Internship project will be the campus Graduate Statistics Internship program, a newly proposed initiative of the campus Statistics Consortium. Another vehicle may be existing statistical Consulting/Practicum courses (e.g., BIOM 688).

AMSC 760 Applied Statistics Practicum (3 Credits).

(NEW COURSE, PROPOSED)

Prerequisite: at least one full year of graduate study in Applied Statistics, plus approval by SAC of a written project proposal.

Students will work in an internship or collaborative research-laboratory setting, for a time equivalent to 10 hours per week for one semester, on a substantive applied quantitative project with significant statistical content, and present a formal written report of 15–30 pages.

AMSC 761 Applied Statistics Seminar (1 Credit). (NEW COURSE, PROPOSED)

Seminar taught once yearly on a rotating basis by faculty engaged in the Applied Statistics Area. Required of AMSC Applied Statistics Area doctoral students within one year following the completion of their Practicum project, AMSC 760, and open only to Applied Statistics Area students. The seminar will include sessions on presentation skills, but will consist primarily of oral presentations of students' past Practicum project results. Students attend throughout the term, give one talk (at least 1/2 hour), and draft a written version of the talk given, based on their Practicum paper.

AMSC 762 Data Analysis Project (1 Credit). (NEW COURSE, PROPOSED)

This course cannot be used to meet any of the Applied Statistics Area's seminar requirements. Offered yearly, required of and limited to MS non-thesis and doctoral students in the Applied Statistics Area, for whom the resulting Projects serve as a Qualifying Exam component. After 6–8 lectures or presentations on components of successful data analyses and writeups, 4–5 sessions will discuss previous student project submissions. The culminating project, to be completed in a two week period between semesters, is an analysis and written report of one of three project choices made available each year to represent a spectrum of realistic applied statistical problems.

Seminar requirement: Oral and written communications skills are critical for the applied statistician. Seminars provide a forum for students to learn to give oral presentations and hear presentations of others. Students will be strongly urged to attend more than the minimum required seminars listed below. PhD students in the Applied Statistics Area will be required to take at least 3 seminars with the following constraints.

1. The required seminar AMSC 761 concerns presentation and discussion of the results of the Practicum.
2. One seminar must include both written and oral presentation. Students will normally meet this requirement by participating for a semester in a Research Interaction Team (RIT) with a focus in an area of applied statistics and a required written report.
3. One seminar must be in the area of application, e.g. engineering, business, economics, biology, etc. It may be an RIT directed by a faculty member outside the Mathematics department. This seminar may not count towards Application area course credits.

Students pursuing the MS without thesis must complete the second and third seminar requirements in this list, and MS with-thesis students must complete the second or third.

Requirements in an area of application

The minimum application-course requirements for this Area of Specialization will be consistent with those of the other AMSC areas. For some applied subject areas, substantially

more coursework — either lecture courses or seminars — may be needed, as determined by the student's Study Advisory Committee.

Comprehensive Qualifying Examinations

The examination requirements for the Applied Statistics Area, both for the Ph.D. and for the Masters' without thesis, include two written examinations and a Data Analysis Project (AMSC 762) . The written examinations are similar to those in the standard Applied Mathematics program, while the Data Analysis project requirement is analogous to the Scientific Computing Area's qualifying requirements involving projects.

Scholarly Paper – MS Without Thesis

Applied Statistics Area students in the non-thesis Master's program, after meeting their examination requirements, must write a scholarly paper with the same guidelines as other MS non-thesis students the Applied Mathematics program.

Candidacy

In order to advance to candidacy, doctoral students must complete all comprehensive exam requirements, the data project and the practicum, and must be in good academic standing. In addition, students must complete their preliminary core coursework before achieving candidacy, but may take up to 9 credits of electives afterwards. Students must also submit to their candidacy oral committees a written candidacy prospectus by approximately two weeks in advance of the required candidacy oral presentation. These guidelines are consistent with existing AMSC guidelines and guidelines of the UM graduate school.

Mandatory Advising

To prevent students from losing focus in an interdisciplinary and interdepartmental program such as the Applied Statistics Area, students will be required to schedule and attend a meeting each semester with (at least one of) their advisors, consisting of their SAC members until they acquire research advisors.

Reports

Students must file SAC reports, a candidacy prospectus and a dissertation proposal in a manner consistent with the other concentrations within AMSC. Students must also comply with regulations of the Graduate School.

Dual degrees

Some students may wish to complete a Master's degree in Applied Statistics and a PhD in an area of application (outside AMSC) or vice-versa. There is an approved Dual Degree

Program at the University, according to which the student is enrolled in a doctoral program but simultaneously earns a Masters' degree in a second program. The governing University rules are described in the Graduate Catalog web-page http://www.gradschool.umd.edu/catalog/dual_doctoral_masters_new.htm . The AMSC Applied Statistics track will encourage such arrangements for suitably prepared students.

V. SAMPLE PROGRAM

The most likely program for students in the Applied Statistics Area would be as follows:

- Yr. 1:** (PhD & MS) STAT 700-701 , STAT 705 (Spring), 2 courses in Application area, 1 seminar, & possibly a SAC-recommended elective.
- Yr. 2:** (PhD & MS) STAT 740 plus second semester of Linear Models or Experimental Design, Multivariate Stat course, 1 RIT (Seminar), plus SAC recommended elective or Application course(s). (MS) work on thesis or scholarly paper.
- Yr. 3:** (PhD & non-thesis MS) Practicum and Data Project, plus specialized research seminar or RIT with (potential) thesis advisor.

A cross-classified and keyword-searchable index of applied statistical courses on the College Park campus, including the Core courses in the Applied Statistics Area together with many of the courses that students in the track might choose as electives, can be found at <http://www.jpsm.umd.edu/stat/coursesearch.asp>.

VI. TRANSITION TO NEW CURRICULUM

AMSC students currently enrolled in the Applied Mathematics track who have not yet attained candidacy and who elect to switch over to the Applied Statistics Area of Specialization will formally request the switch through the AMSC Director. Recognition of previously completed coursework and Qualifying Examinations within the Applied Statistics Area will be determined on a case-by-case basis by the Director and the SAC formed for the student.

Assessment Plans

The Assessment Plans for AMSC Applied Mathematics track include the currently available Statistics courses and degree programs. Initially, these Plans will be followed also for the new Applied Statistics Area of Specialization within AMSC. After the Data Analysis Project and Practicum courses have run at least once, these Plans will be adapted to new Assessment Plans for the Applied Statistics Area that will reflect the special features of the new program elements of this Area, especially the Data Project and Practicum and the skills they are designed to teach.

Eric V. Slud, MATH

10/22/07



UNIVERSITY OF MARYLAND

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Office of the Chair

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September 24, 2007

Professor Konstantina Trivisa
Director AMSC
Department of Mathematics
Campus

Dear Professor Trivisa,

The Math Department strongly supports the creation of an applied statistics area of specialization in AMSC. We are willing to put our resources behind it. If the applied stat "track" is approved, the Department of Mathematics will assure support for the statistics program including continuing TA support for AMSC students at substantial levels. We currently allot 40% of our available TA positions to AMSC, and we plan to continue this distribution. It is likely to increase as we see our "statistics" students switching to "AMSC".

We will also plan to continue running Stat 700-701 and Stat 740-741 and Stat 705 every year and Stat 650 every other year.

We will also allocate 2 credits of faculty teaching of AMSC Applied-Stat related seminars, i.e., the courses AMSC 760-762 in the Proposal. That is, Math Department faculty will get teaching credit for such administrating Applied-Stat related seminars.

AMSC is funded as follows:

- CSCAMM (Center for Scientific Computing and Mathematical Modeling) is providing \$27,000 per year.
- IPST (Institute for Physical Science and Technology) is providing \$20,000 per year.
- The Mathematics Department is providing \$33,000 per year.
- If the Stat Track is approved, the support will increase by \$18,000, which will be provided by Math, IPST and the CMPS Dean's office.

Yours sincerely,

James A Yorke
Chair, Department of Mathematics
Distinguished University Professor of Mathematics and Physics
yorke@umd.edu
301-405-5051

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

December 12, 2006

Dear Professor Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

As envisioned in the AMSC Applied Statistics Area proposal, the new Area would involve Statistics faculty members from my department in the occasional advising of AMSC students, as they may also do in the current AMSC Program. However, the new Area would involve those faculty members in new occasional tasks related to the preparation and grading of Data Analysis Project qualifying examinations and teaching of Applied Statistics and Practicum seminars. As envisioned in the AMSC Applied Statistics Area proposal draft, the average demands on my faculty would be a total of 1 credit of teaching per academic year.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely yours,

G. Anandalingam
Chair, Decision and Information Technologies
Robert H. Smith School of Business
University of Maryland



**UNIVERSITY OF
MARYLAND**
DEPARTMENT OF SOCIOLOGY

Professor Suzanne Bianchi
2112 Art-Sociology Bldg. (#146)
College Park, Maryland 20742-1315
301.405.6394 TEL 301.314.6892 FAX

January 5, 2007

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

Dear Professor Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. As envisioned in the AMSC Applied Statistics Area proposal draft, the new Area would impose no resource costs on my academic unit. I support the establishment of the new AMSC Applied Statistics Area of concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely,

A handwritten signature in cursive script that reads "Suzanne M. Bianchi".

Professor and Chair

December 22, 2006

The Joint
Program in
Survey
Methodology

Eric Slud and James Yorke
Professors
Mathematics Department
College of Computer, Mathematical, and Physical Sciences



*University of
Maryland at
College Park*

*University
of Michigan*

Westat, Inc.

Dear Eric and Jim,

I'm happy to offer this letter in support of the proposed Applied Statistics track within the AMSC Program. The faculty of the Joint Program believes the program will meet an important need on campus. I have reviewed the proposal carefully and I'm convinced that the Applied Stat track will prove to be a valuable addition to the AMSC Program and an asset to the graduate program at the University of Maryland.

I envision that our faculty will help in running the Applied Statistics Area of AMSC by (a) by supplying survey-related data and guidelines as one of the Data Analysis Projects in the Data Analysis Project qualifying examination, and grading those student projects done with these data; and (b) by agreeing to give occasional hour lectures each year in one of the applied statistics seminars (AMSC 761 or 762). We wish the program every success.

Sincerely,

A handwritten signature in black ink that reads "Roger Tourangeau". The signature is fluid and cursive.

Roger Tourangeau,
Director, Joint Program in Survey Methodology



UNIVERSITY OF MARYLAND

College Park, Maryland 20742-2611
301.405.2438 TEL

COLLEGE OF HEALTH AND HUMAN PERFORMANCE
Office of the Dean

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

December 11, 2006

Dear Dr. Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. I heartily support the new area of concentration. As envisioned in the AMSC Applied Statistics Area proposal draft, the new Area would impose no resource costs on my academic unit. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. This new program may interest graduating MPH students with a concentration in Biostatistics from the new School of Public Health who ultimately choose to pursue a PhD in Applied Statistics. I also will encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department. My Department of Epidemiology and Biostatistics does not offer a PhD in Biostatistics, and this new area of concentration may be of interest to my Biostatistics faculty who are interested in advising doctoral students in Applied Statistics.

I wish you success in the new area of concentration.

Yours Truly,

A handwritten signature in black ink, appearing to read "Deborah Rohm Young".

Deborah Rohm Young, Ph.D.
Interim Chair, Department of Epidemiology and Biostatistics
Associate Professor, Kinesiology



UNIVERSITY OF
MARYLAND

EARTH SYSTEM SCIENCE INTERDISCIPLINARY CENTER
Office of the Director

2207 Computer and Space Sciences Building
University of Maryland
College Park, Maryland 20742-2465 USA
TEL: (301) 405-5599 FAX: (301) 405-8468
www.essic.umd.edu

December 7, 2006

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building
CAMPUS

Dear Professor ^{Jim}Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. As envisioned in the AMSC Applied Statistics Area proposal draft, the new area would impose no resource costs on ESSIC. Applied statistics are a key and crucial element of Earth System Science ranging from the analysis of output from coupled climate models to satellite observations of global change. Therefore, I enthusiastically support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of ESSIC. I would encourage our faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in Earth System Science.

Sincerely yours,

Antonio J. Busalacchi
Director and Professor
Earth System Science Interdisciplinary Center

AJB/klm



UNIVERSITY OF MARYLAND

CENTER FOR BIOINFORMATICS AND COMPUTATIONAL BIOLOGY
INSTITUTE FOR ADVANCED COMPUTER STUDIES

3125 Biomolecular Sciences Building #296
College Park, Maryland 20742-3360 USA
301.405.3956 TEL 301.314.1341 FAX
<http://cbeb.umd.edu>

Horvitz Professor, Department of Computer Science

November 5, 2007

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

Dear Jim:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me in October 2006. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical scientists with applied interests in subject areas such as those of Computer Science (my home department) and Bioinformatics (my research Center). I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter when appropriate into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in computer science, bioinformatics, molecular biology, genetics, or other areas relevant to my Department or Center.

Sincerely yours,

A handwritten signature in black ink, appearing to read "S. Salzberg".

Steven Salzberg



UNIVERSITY OF
MARYLAND

Department of Economics
College Park, Maryland 20742-7211
301.405.3476 TEL 301.405.3542 FAX
murrell@econ.umd.edu EMAIL

December 8, 2006

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

December 12, 2006

Dear Professor Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. As envisioned in the AMSC Applied Statistics Area proposal draft, the new Area would impose no resource costs on my academic unit, apart from some occasional advising. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely yours,

A handwritten signature in black ink that reads "Peter Murrell". The signature is written in a cursive style with a long horizontal line extending from the end.

Peter Murrell
Professor and Chair, Economics



UNIVERSITY OF MARYLAND

COLLEGE OF EDUCATION
DEPARTMENT OF MEASUREMENT, STATISTICS AND EVALUATION

Benjamin Building, Room 1230
College Park, Maryland 20742-1115
301.405.3624 TEL 301.314.9245 FAX

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

February 26, 2007

Dear Professor Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

As envisioned in the AMSC Applied Statistics Area proposal, the new Area would involve statistical faculty members from my department in the occasional advising of AMSC students, as they may also do in the current AMSC Program. However, the new Area would involve those faculty members in new occasional tasks related to the preparation and grading of Data Analysis Project qualifying examinations and teaching of Applied Statistics and Practicum seminars. As envisioned in the AMSC Applied Statistics Area proposal draft, the average demands on my faculty would be a total of 1 credit of teaching per academic year.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'CMT' or similar initials.

C. Mitchell Dayton, Professor & Chair
Department of Measurement, Statistics & Evaluation



UNIVERSITY OF MARYLAND

DEPARTMENT OF COMPUTER SCIENCE

A. V. Williams Building
College Park, Maryland 20742
301.405.2662 TEL

Professor James Yorke
Director, AMSC
AMSC Offices
Mathematics Building

March 22, 2007

Dear Professor Yorke:

This letter concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of September 12, 2006, and sent to me on October 12, 2006. As envisioned in the AMSC Applied Statistics Area proposal draft, the new Area would impose no resource costs on my academic unit. I strongly support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely yours,

A handwritten signature in black ink, appearing to read "L. Davis".

Larry Davis
Chair, Department of Computer Science

April 17, 2008

Professor Konstantina Trivisa
Director, AMSC
AMSC Offices
Mathematics Building

Dear Professor Trivisa:

I enjoyed meeting with you today and it is my pleasure to write this letter as per our discussion. This letter was written in consultation with the Biometrics faculty in ANSC and ENST and concerns the newly proposed AMSC Applied Statistics Area of Concentration, summarized in a Proposal Draft of October 22, 2007, which was sent to us on April 9, 2008. I support the establishment of the new AMSC Applied Statistics Area of Concentration on the College Park campus when revised as discussed and outlined below.

As envisioned in the revised AMSC Applied Statistics Area proposal, the new Area would involve statistical faculty members from my department in the occasional advising of AMSC students. The new Area would involve those faculty members in occasional tasks related to the preparation and grading of Data Analysis Project qualifying examinations and teaching of Applied Statistics and Practicum seminars. As envisioned in the AMSC Applied Statistics Area proposal draft, the average demands on my faculty would be a total of 1 credit of teaching per academic year. It is my understanding that two BIOM courses are to be specifically named as alternatives allowed for core Applied Stat Area courses:

BIOM 602 Experimental Design as an allowed equivalent for STAT 741
BIOM 621 Applied Multivariate Statistics as an allowed equivalent (in parallel with BMGT 882, EDMS 771, and STAT 750) for the core course in Multivariate Statistics.

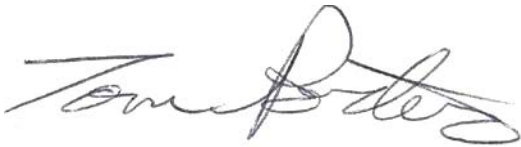
Language will be inserted (but not specific course numbers) to indicate that other statistical courses campus-wide will become allowed equivalents for the STAT 705 Statistical Computing course in the future. The BIOM Consulting Experience course should be a possible pathway for students to complete the Practicum [AMSC 762] requirement.

My faculty would in principle agree to participate and advise students in the program, and I promise to provide 1 academic credit per year of faculty teaching resources so that BIOM faculty can and will participate in the new Area as instructors on

a rotating basis within the proposed Data Analysis Project [AMSC 762] and Applied Stat Seminar [AMSC 761] course structure.

The new Area of Concentration in Applied Statistics provides a new vehicle for the training on the College Park campus of interdisciplinary statistical methodologists with applied interests in subject areas such as those of my academic department. I would encourage my faculty with methodological interests in Statistics to participate in the AMSC program and to enter on occasion into advising or co-advising arrangements with AMSC students who show sufficiently strong interests and backgrounds in the academic discipline of my department.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Tom Porter". The signature is written in black ink on a white background.

Tom E. Porter, Chair
Department of Animal and Avian Sciences

TEP:kms

Subject: Applied Statistics program proposal (fwd)
From: Konstantina Trivisa <trivisa@math.umd.edu>
Date: Mon, 28 Apr 2008 16:50:44 -0400 (EDT)
To: crector@umd.edu
CC: evs@math.umd.edu, fjcoale@umd.edu

Dear Claudia,

Please see below the message sent by Professor F.J. Coale where he expresses support for the development of the AMSC Applied Statistics Area of Concentration as outlined in our proposal and further defined in Tom Porter's letter of April 17, 2008 (attached).

Please let me know if there is anything else that you need from us. I would like to let you know that I'll be available and happy to participate at any meeting relevant to this proposal on Thursday this week.

Please let me know if my presence is need as well as the time and location of the meeting.

With best regards,

Konstantina Trivisa
Director of AMSC

----- Forwarded message -----
Date: Mon, 28 Apr 2008 16:02:13 -0400
From: Frank Coale <fjcoale@umd.edu>
To: Konstantina Trivisa <trivisa@math.umd.edu>, Eric V. Slud <evs@math.umd.edu>
Cc: Tom Porter <teporter@umd.edu>
Subject: Applied Statistics program proposal

Eric & Konstantina,

After consulting with faculty teaching in the Biometrics program and reading Tom Porter's response following the joint meeting on April 17, I support the development of the AMCS Applied Statistics Area of Concentration as outlined in your proposal and further defined in Tom Porter's letter of April 17, 2008 (attached).

Best wishes for success,
Frank

Frank J. Coale, Ph.D.
Professor & Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA
Telephone: 301-405-1306
Email: fjcoale@umd.edu

Response from ANSC after meeting.pdf

Content-Type: APPLICATION/PDF
Content-Encoding: BASE64

To: Eric. V. Slud
Mathematics Department

From: Desider Viktor
Director for Collection Management and Special Collections

Date: October 19, 2007

Re: Library Resources Assessment

The Mathematics Department proposes to change the name of the Applied Mathematics and Scientific Computation program to Applied Mathematics, Statistics, and Scientific Computation, and to create within it an area of specialization in Applied Statistics leading to MS and PhD degrees.

Current library collections in these subjects are assessed as at least adequate based on present and anticipated programmatic emphases and needs. Libraries staff will work closely with faculty in the new specialization to monitor collection requirements, especially as they may grow and evolve over time.

Books

The Libraries' current collection of probability, statistics and applied mathematics books is sufficient to meet the needs of the program. The ongoing acquisition of scholarly books is expected to be adequately covered through existing acquisition practices and budgeting.

Journals

Journal Citation Reports, a database that uses citation data to rank and determine the impact factor of journals within given academic fields, lists 83 journals for the subject "Probability and Statistics." Twenty of these titles have an impact factor (IF) of 1.3 or above. The highest impact journal, *Bioinformatics*, to which the Libraries subscribe, has an IF of 4.894. The Libraries currently subscribe to all of the relevant top 20 titles in this category.

JCR lists 150 journals for the subject "Mathematics, Applied." Eighteen of these titles have an impact factor (IF) of 1.3 or above. The Libraries already subscribe to fourteen of these titles that are considered by the faculty most relevant to the needs of the program.

The American Statistical Association will begin publishing a new journal in 2008, *Statistics in Biopharmaceutical Research*. No price information is available at this time, but the average 2008 price of an ASA journal is \$247.00.

Databases

UM Libraries subscribes to the core databases that would be necessary for graduate research in applied statistics. These include *Current Index to Statistics*, *MathSciNet*, and *Web of Science*.

Data Sets

As a Regional Depository Library, the UM Libraries receive statistical information from Federal agencies in both print and electronic (i.e., CD-ROM) format.

Should the program require the Libraries to purchase and make accessible specific commercial data sets, funding would be required for the data as well as any software or hardware needed to access and manipulate the data. In addition to budgeting for the data and required equipment, there could be a significant impact on library space and staff.

Funding

Based on our assessment, the Libraries' determination is that existing collection resources are overall sufficient to support the program at the indicated levels.

The continued quality support for this and other programs is dependent on ongoing funding and other circumstances affecting collection resources and journal subscriptions in particular.