November 26, 2007

MEMORANDUM

TO: Charles Caramello  
   Associate Provost and Dean, Graduate School

FROM: Phyllis Peres  
   Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to establish an MPS in Geographic Information Sciences (PCC log no. 06051) and a GCPS in Geographic Information Sciences (PCC log no. 06050)

On November 12, Chancellor Kirwan gave final approval to your proposals to establish both a Master of Professional Studies and a Graduate Certificate in Professional Studies in Geographic Information Sciences. Copies of the approved proposals are attached.

CWR/

Enclosure

cc: Carmen Balthrop, Chair, Senate PCC Committee  
    Sarah Baader, Office of Student Financial Aid  
    Mary Giles, University Senate  
    Barbara Hope, Data Administration  
    Denise Nadasen, Institutional Research & Planning  
    Anne Turkos, Archives  
    Linda Yokoi, Office of the Registrar  
    Mary Ann Ottinger, Graduate School  
    Victoria Peterson, Office of Professional Studies  
    Edward Montgomery, Dean, College of Behavioral and Social Sciences  
    Herbert Rabin, Interim Dean, A. James Clark School of Engineering
November 12, 2007

Dr. C. D. Mote, Jr.
1101 Main Administration Building
University of Maryland, College Park
College Park, MD 20742

Dear Dan:

Thank you for forwarding the request from the University of Maryland, College Park to offer new Graduate Certificates in Professional Studies and the Master of Professional Studies. I am pleased to approve these recommendations.

Graduate Certificates in Professional Studies

- Graduate Certificate in Professional Studies in Arabic
- Graduate Certificate in Professional Studies in Chinese Language
- Graduate Certificate in Professional Studies in Food Safety Risk Assessment
- Graduate Certificate in Professional Studies in Geospatial Information Sciences
- Graduate Certificate in Professional Studies in Information Assurance
- Graduate Certificate in Professional Studies in Public Health Informatics
- Graduate Certificate in Professional Studies in Radar Signal Processing
- Graduate Certificate in Professional Studies in Real Estate Development
- Graduate Certificate in Professional Studies in Sport Management
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Master of Professional Studies

- Master of Professional Studies in Arabic
- Master of Professional Studies in Geospatial Information Services
- Master of Professional Studies in Leadership Education & Development
- Master of Professional Studies in Persian
- Master of Professional Studies in Real Estate Development

Sincerely,

[Signature]
William E. Kirwan
Chancellor

cc: Irwin Goldstein, Senior Vice Chancellor for Academic Affairs
    Theresa Hollander, Associate Vice Chancellor for Academic Affairs
    Nariman Farvardin, Senior Vice President for Academic Affairs and Provost
    Phyllis A. Peres, Associate Provost, Academic Planning & Programs
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 February 19, 2007

COLLEGE/SCHOOL
Office of Professional Studies, Graduate School, College of Behavioral and Social Sciences and A. James Clark School of Engineering

DEPARTMENT/PROGRAM Geography

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

DESCRIPTION (Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide old and new sample programs for curriculum changes.)

Attached is a program proposal for a Master of Professional Studies in Geospatial Information Sciences (GIS)

JUSTIFICATION/REASONS/RESOURCES (Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.)

A new graduate program designed for a professional audience. After conducting market research, the need for increased proficiency in Geospatial Information Sciences (GIS) is evident in the regional area. This program is self-support.

=====================================================================

APPROVAL SIGNATURES

1. Department Committee Chair

2. Department Chair

3. College/School PCC Chair N/A

4. Dean

5. Dean of the Graduate School (if required) 4/20/07

6. Chair, Senate PCC 4-20-07

7. Chair of Senate

8. Vice President for Academic Affairs & Provost 11/26/07

VPAAP 8-05
PROPOSAL FOR

NEW INSTRUCTIONAL PROGRAM

UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND

Master of Professional Studies in Geospatial Information Sciences (GIS)

PROPOSED INITIATION DATE: Fall 2007
I. OVERVIEW and RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it. [You may want to refer to student demand, market demand for graduates, institutional strengths, disciplinary trends, synergy with existing programs, and/or institutional strategic priorities.]

The University of Maryland is committed to providing educational programs that meet the needs of a variety of audiences. As part of our graduate offerings, the Master of Professional Studies and the Graduate Certificate in Professional Studies are career-focused degrees designed for students who wish to increase their subject-matter knowledge as well as prepare themselves for new challenges related to their professional areas. These programs are administered by the Office of Professional Studies (OPS), with academic oversight provided by the Graduate School.

Introduction

According to the U.S. Department of Labor, the geospatial technology industry can be defined as an information technology field of practice that acquires, manages, interprets, integrates, displays, analyzes, or otherwise uses data focusing on geographic, temporal, or spatial contexts. It incorporates tools such as aerial and satellite remote sensing imagery, global positioning systems (GPS), and computerized geographic information systems (GIS).

The Master of Professional Studies in Geospatial Information Sciences (GIS) will focus on advanced geospatial information sciences and their related technologies. The growth of Geospatial Information Sciences has underpinned the rejuvenation of the geography discipline, in the U.S. and internationally, over the last three decades. Geospatial technologies include computer-based geographic information systems, remote sensing, and spatial analysis and modeling.

The University of Maryland Department of Geography has built a world class research program sustained by over $5 million of research grants on an annual basis. The Department of Geography is recognized nationally and internationally for its leadership in land remote sensing and allied GIS applications. The department’s undergraduate program has more than doubled in size since the introduction of our Geographic Information Systems and Automated Cartography focus in the early 1990’s. The Department of Geography will use its accumulated experience to provide a cutting edge Master’s degree for professionals; exploiting its unique academic profile within the Washington, D.C. region.

Nature of proposed program

Drawing on the considerable expertise of GIS faculty within the Department of Geography, the 31-credit Master of Professional Studies in Geospatial Information Sciences will provide education in all the key areas of GIS most relevant to the
contemporary workplace, including Geographic Information Systems methods, remote sensing techniques, spatial analytical methods, modeling and specialized computer programming tailored to GIS needs.

Students will be well-versed in the theoretical underpinnings of GIS and given substantial practical experience in the application of state of the art computer-based systems to a wide range of real world problems. The Master's program is designed to accommodate GIS working professionals.

**Market for Graduates**

Introduction of a Master of Professional Studies in Geospatial Information Sciences is part of a larger trend nationally and internationally. In 2004, the U.S. Department of Labor identified geospatial technologies as one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology.

Adeo Strategy Partners conducted a market analysis for the University of Maryland College Park Office of Professional Studies about a potential Master’s level degree and/or graduate certificate program in the field of Geospatial Information Sciences. Adeo’s research concluded that Geospatial Information Sciences is a field that is experiencing rapid growth. It is used heavily in the federal government, and is growing quickly in state, county, and local government. Private industry, traditionally focused on supplying GIS to the federal government alone, is discovering applications for GIS in multiple directions.

Demand for well-trained GIS professionals is growing much faster than supply. Trained individuals are needed at multiple levels – from certified entry-level technicians to Ph.D. research scientists. There is a strong demand in the Greater Washington D.C. area for educated GIS personnel.

Neither the national nor the regional educational markets have been able to keep up with the demand for GIS professionals, though programs are exploding onto the market from many sources. The only strong regional competition for a post-baccalaureate program comes from Penn State University (online programs for both a post-baccalaureate certificate and a Master’s degree). Other local offerings are focused on select courses at the undergraduate level and include Towson University and University of Maryland Baltimore Campus as the most recognized.

Given the strong demand for GIS professionals and the lack of adequate supply in the local area, the University of Maryland College Park has the opportunity to meet a need that exists immediately. In fact, some industry professionals warn that any program not launched relatively soon risks being "late to the market."
B. How big is the program expected to be? From what other programs serving current students, or from what new populations of potential students, onsite or offsite, are you expecting to draw?

The Master of Professional Studies in Geospatial Information Sciences is designed for students with diverse backgrounds (e.g., engineering, computer sciences, social sciences, earth sciences and geography) who require specialized training in Geographic Information Sciences and in the application of geospatial technologies, specifically geographic information systems, remote sensing, spatial analysis and modeling. Students are trained for careers in all the private, public, and nonprofit sectors.

The program will draw a professional audience. Initial enrollment is anticipated at 5 – 10 students in Year 1 (GCPS and MPST combined). Expected growth is to reach 10 – 15 students in Year 2.

II. CURRICULUM

A. Provide a full catalog description of the proposed program, including educational objectives and any areas of concentration.

The Master of Professional Studies in Geospatial Information Sciences is a 31-credit graduate program (10 courses and a 1-credit professional practices seminar) comprised of courses from the Department of Geography located in the College of Behavioral and Social Sciences and one course from the A. James Clark School of Engineering, at the University of Maryland College Park.

B. List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

The program will consist of the following required (existing) courses:

**Required Courses (12 credits):**

**GEOG 472 Remote Sensing: Digital Processing and Analysis; (3 credits)**
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and geo registration. Analysis methods include digital image exploration, feature extraction, thematic classification, change detection, and biophysical characterization. One or more application examples may be reviewed. There is a $40.00 lab fee for this course.

**GEOG 473 Geographic Information Systems and Spatial Analysis; (3 credits)**
Analytical uses of geographic information systems; data models for building geographic data bases; types of geographic data and spatial problems; practical experience using advanced software for thematic domains such as terrain analysis, land suitability
modeling, demographic analysis, and transportation studies. There is a $40.00 lab fee for this course.

GEOG 606 Quantitative Spatial Analysis; (3 credits)
This course covers the statistical modeling of spatial data and data analysis that are most useful to geographers and others who use spatial data. It provides the student with more advanced methods with an emphasis on practical techniques for problem solving. Home assignments are designed to help the student understand the fundamental concepts and principles in depth and allow the student to gain experience in the use of S-Plus statistical software and two powerful extensions of ArcGIS 9.1: Spatial analyst, and Geostatistical analyst. There is a $40.00 lab fee for this course.

GEOG 676 Programming for GIS; (3 credits)
This course is an introduction to programming for geography graduate students. The foundational concepts of computer programming will be introduced and the Visual Basic programming language will be the implementation medium for those concepts. By the end of the semester students will be able to design and implement programs that are correct, robust, and user-friendly for a variety of situations using both structured and object-oriented programming concepts. This course will also present advanced programming concepts and practice, including modeling environmental situations and ArcObjects, the underlying structure of ArcGIS. There is a $40.00 lab fee for this course.

Advanced GIS (6 credits: select 2 of the 4):

Geographic Information Systems:

GEOG 673 GIS Modeling; (3 credits)
This course introduces advanced techniques in the GIS data manipulation, geostatistics and geospatial modeling. The fundamental theories behind the analytical and modeling techniques are covered in detail. The theoretical knowledge will be enforced by a series of intensive computer exercises using real data sets. It covers descriptive and predictive GIS modeling techniques, including logit modeling (logistic regression), spatial statistics, geo-statistics, environmental diversity indices, Boolean logic, and map algebra. There is a $40.00 lab fee for this course.

GEOG 674 GIS Spatial Databases (3 credits)
Many GIS functions revolve around spatial attribute data management. Therefore, a good understanding of database design and manipulation is of great benefit for the GIS practitioner. This course uses typical GIS database software and covers data acquisition & database creation, data structure & modeling, data management, information queries, and integration of multiple data sources in GIS. This course will also cover Oracle and Internet database and web services. There is a $40.00 lab fee for this course.
Remote Sensing:

**GEOG 671 Remote Sensing Instruments and Observations (3 credits)**
Detailed examination of land remote sensing instruments, observatories and resultant measurements in the optical portion of the EM spectrum. Includes computer-based exercises that examine the importance of data geo-registration and radiometric calibration in land measurements. There is a $40.00 lab fee for this course.

**GEOG 672 Biophysics of Optical Remote Sensing (3 credits)**
Biophysical principles, phenomena and processes underlying multispectral remote sensing in the optical portion of the EM spectrum. Includes computer-based exercises that explore the biophysical basis of land patterns and dynamics observed in remote sensing data. There is a $40.00 lab fee for this course.

Professional Project Management and Final Project (7 credits):

**GEOG 795 Professional Practices Seminar (1 credit)**
A professional practice seminar will be included to help prepare students for the work place. Topics will include development of a resume, physical preparation of a resume, choosing and helping reference writers, conduct of a successful interview, negotiating an employment package, giving professional presentations, proposal preparation, writing reports, codes of ethics and responsibilities to the broader community including pro bono work. The course will include presentations from practitioners in the GIS field. This course will also include basic project management skills and strategies to help prepare students for undertaking the internship and resultant final project.

**ENCE 662 Introduction to Project Management (3 credits)**
Introduction to project management including: overview and concepts of project management (principles, body of knowledge, strategies); planning successful projects (defining, specifying, delivery options, scheduling, budgeting); implementing (organizing the team, work assignments, team building, effective leadership); executing (performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management); and closeout(performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management).

**GEOG 797 Professional Project (3 credits)**
Each student must undertake a project as a demonstration of his/her competence in geospatial science and technologies. The data and materials for this project can originate from an internship (internal or external to the department), or from relevant work experience at the student’s current employer. The Geography Department will work with each student individually to determine the best mechanism for obtaining the necessary data and experience. Under the direction of a faculty advisor, the student will prepare a Project Report which shall contain an explanation of the requirements for the work, a technical account of the activities undertaken, including a literature review, a
description of the methods and approaches taken, a critical discussion of the results obtained, along with conclusions and recommendations developed from the project. The final project will consist of a full fledged GIS application that is up and running and can be tested. This will enable the student to present potential employers with a portfolio containing an example of their ability to manage and develop a GIS application project and will show that they understand how to apply the technology to real world situations.

**Systematic Classes in Graduate Geography (6 credits):**

**Students will choose one human and one physical 600-level course (3 credits each)**

**GEOG 600 Introduction to Human Geography (3 credits)**
Introduces students to current trends and developments in human geography in the areas of geography as social science, space and place, and human dimensions of global change, and to research procedures in this field.

**GEOG 602 Introduction to Physical Geography (3 credits)**
Introduces students to current trends and developments in physical geography and to research procedures in the field.

**GEOG 614 Human Dimensions of Global Change (3 credits)**
The intersection of human and biophysical systems from the vantage point of the impact of human actions on the environment are examined. The impact of the biophysical environment on humans is also discussed.

**GEOG 615 Land Cover and Land Use Change (3 credits)**
This class provides an examination of land cover and land use change science, addressing the causes, impacts and projection of change. Key concepts of land use science are presented and recent research papers and case studies are reviewed. Class consists of lectures, invited presentations and individual student projects and presentations.

**GEOG 632 Economic Geography (3 credits)**
An advanced graduate level introduction to the effects of geography on economic activities and the effects of economic incentives, institutions, and activities on the nature and sustainability of human and environmental geographic systems.

**GEOG 642 Ecosystem Processes and Human Habitability (3 credits)**
Biological and biogeographical processes relevant to the capability of the earth's biota to support the demands of its human populations.

**GEOG 645 Advanced Climatology (3 credits)**
Advanced study of elements and controls of the Earth's climate. Analysis of the energy and water balances at the earth's surface and their importance and application to life on this planet.
C. Describe any selective admissions policy or special criteria for students selecting this field of study.

It is required that student applicants will have completed a sequence of course work equivalent to the Department of Geography's 300-level offerings in statistics, remote sensing, GIS, and computer cartography as well as one year of calculus. Students who do not have this academic background may have sufficient professional experience to warrant acceptance into the program.

The admissions policy will reflect current standards established by the Graduate School, including the prerequisite bachelor's degree and a cumulative 3.0 GPA. Official undergraduate transcripts from all colleges attended must be provided. A current resume is required.
III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

The purpose of this assessment plan is to set clear guidelines, identify articulated outcomes, and ensure avenues for continuous improvement. It is the mission of the Office of Professional Studies to provide programs that meet UMD’s institutional goals and objectives for educational activities.

<table>
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<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Measures and Criteria</th>
<th>Assessment Schedule</th>
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| 1. Students will illustrate comprehension of issues related to Geospatial Information Sciences (GIS). | Measurement A: Successful completion of paper and/or special project focusing on issues related to GIS.  
Criterion A: 80% of students will attain a 2 or better on Comprehension Scale  
Measurement B: OPS Pre and Post-Test Assessment.  
Criterion B: 80% of students will show gains between Pre and Post-Test questions #2, #3, #4, #5 and #6 (see attachment). | Comprehension Scale will be scored by faculty, and data collected annually by OPS.  
All Pre-Test data will be collected by OPS prior to first class attendance by annual cohort.  
All Post-Test data will be collected by OPS after conclusion of last class by annual cohort. |
| 2. Students will assess the relevance of program content as it applies to their professional and educational needs | Measurement A: An exit interview will be conducted with a random sample of graduates (80%) to assess their overall satisfaction with the certificate.  
Criterion A: 80% of respondents will correlate academic program offerings to needs  
Measurement B: OPS Pre and Post-Test Assessment.  
Criterion B: 80% of students will show gains between Pre and Post-Test questions #7, #8, #9, and #10 (see attachment). | Responses will be collected and discussed with the Academic Oversight committee for retention purposes.  
All Pre-Test data will be collected by OPS prior to first class attendance by annual cohort.  
All Post-Test data will be collected by OPS after conclusion of last class by annual cohort. |
IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program? [This might be a department, a departmental subgroup, a list of faculty members, or some other defined group.]

The degree will be housed in the Graduate School.

Continuing academic and program direction will be provided by the Program Oversight Committee while the project itself will be managed by the Office of Professional Studies. Members of the Program Oversight Committee include:

Graduate Director (academic chair):
Shunlin Liang
Associate Professor, Department of Geography
College of Behavioral and Social Sciences

Graduate School Representative:
Charles Caramello
Dean, Graduate School

OPS Program Representative (program management chair):
Ken Carter
Program Manager, Office of Professional Studies

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure.

The Master of Professional Studies in Geospatial Information Sciences will be housed in the Graduate School and managed by the Office of Professional Studies. A faculty member from the Department of Geography in the College of Behavioral and Social Sciences will serve as Graduate Director and will provide the academic leadership for the team. OPS will manage and coordinate the Program Oversight Committee as well as all other components of the program.

Faculty selection and appointments will be made by the Department of Geography. All faculty, including adjunct faculty, will be members of the Graduate Faculty and approved by the Dean of the Graduate School to teach.
V. OFF-CAMPUS PROGRAMS (if necessary)

A. If at Shady Grove – indicate how students will access student services

    Not applicable

B. If on-line – describe the concerns in “Principles and Guidelines for Online Programs” are to be addressed.

    If the program decides to offer courses on-line, the PCC will be consulted for guidance.

VI. OTHER ISSUES

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

    Not applicable

B. Will the program require or seek accreditation? Is it intended to provide certification or licensure for its graduates? Are there academic or administrative constraints as a consequence?

    No

VII. COMMITMENT TO DIVERSITY

The University of Maryland is an equal opportunity institution with respect to both education and employment. The University does not discriminate on the basis of race, color, national origin, sex, age, or handicap in admission or access to, or treatment or employment in, its programs and activities as required by federal (Title VI, Title IX, Section 504) and state laws and regulations.

Through its actions and statements of policy the University of Maryland has demonstrated a commitment to diversity by creating programs of study which explore the experiences, perspectives, and contributions of a wide variety of cultures, groups, and individuals; and has sought to create a campus environment which encourages tolerance and respect for individuals regardless of differences in age, race, ethnicity, sex, religion, disability, sexual orientation, class, political affiliation, and national origin.

VIII. REQUIRED PHYSICAL RESOURCES

A. Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff.
This program uses existing courses and therefore additional library resources are not required.

B. Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc.

This program does not require additional resources.

C. Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers.

This program does not require additional resources.

IX. RESOURCE NEEDS AND SOURCES

A. List new courses to be taught and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.

There will be no impact on existing resources. This program is self-support. Courses may be cancelled due to low enrollment.

B. List new faculty, staff, and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them

Adjunct University of Maryland faculty may be needed for this program. University of Maryland faculty who teach in the program will be compensated using overloads. Other faculty may include retired faculty and professionals in the field. Adjuncts will be paid from course tuition.

C. Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.

Approval of all faculty overloads for teaching and advising will be in accordance with University of Maryland policy and procedures. OPS is responsible for the overall administrative management of the program.

D. Identify the source to pay for the required physical resources identified in Section VIII. above.

Tuition revenue will be used to cover the program expenses.
E. List any other required resources and the anticipated source for them

   Not applicable

F. Complete the additional proposal and financial tables as required by MHEC.

   Not applicable for MPST/GCPS programs.

Additional Approvals (see PCC coversheet for other required signatures)

Judith K. Broida
Associate Provost and Dean, Office of Professional Studies

3/7/07

Nariman Farvardin
Dean, A. James Clark School of Engineering