Alabama Commission on Higher Education

PROPOSAL FOR A NEW DEGREE PROGRAM – NEW APPLICATION TOOL

Please check one: [X] Baccalaureate Program [ ] Graduate Program

A. General Information

1. Institution: **Auburn University**

2. Institutional Contact: **Timothy R. Boosinger, DVM, Ph.D.**
   Title: **Provost and Vice President for Academic Affairs**
   Telephone: **334.844.5771**
   E-mail: **provost@auburn.edu**

3. Program Identification--
   Field of Study/ Program Title: **Geospatial and Environmental Informatics**
   Degree: **Bachelor of Science**
   CIP Code: **45.0702 Geographic Information Science and Cartography**

4. Date of Proposal Submission:

   December 2016

5. Proposed Program Implementation Date:

   Fall 2017

6. Program Administration:
   Name of College/School: **School of Forestry & Wildlife Sciences**
   Name of Dean: **Dr. Janaki Alavalapati**
   Name of Department: **NA**
   Name of Chair: **NA**

B. Program Purpose and Description

1. In no more than one paragraph describe the purpose of the proposed program. Please also include a brief statement regarding how the program's purpose is related to the University's mission and goals.

   The Bachelor of Science in Geospatial and Environmental Informatics will provide students rigorous training in fundamental theories, concepts, quantitative tools, analytical technologies and research skills that are used to acquire spatially and temporally referenced information and analyze spatial and temporal processes. Using Science, Technology, Engineering, & Mathematics (STEM) as the base, this program draws from several disciplines including forestry and wildlife, agriculture, geography, engineering and business. As such it is consistent with Auburn University goals and priorities. Selected and relevant faculty from colleges of Agriculture, Science and Mathematics, Engineering, and Business has expressed strong support to move this program forward. Since the geospatial and informatics applications are pervasive in managing forests, wildlife, other natural resources, and urban landscapes, the school has great support from stakeholders across the state of Alabama and beyond. Faculty, staff, and students in the SFWS, have been using geospatial and informatics tools in their teaching, research, and extension and have a lot of expertise to lead this program.

2. Please provide a description of the specific kinds of employment opportunities, post-graduate professional degree programs, and other graduate programs that will be available to the graduates.

   A degree in Geospatial and Environmental Informatics will open the door to a multitude of career paths. These would be found in industry, government, non-profit organizations, educational institutions and media. They include Environmental Planner, Remote Sensing Technologists, Environmental or Forestry Consultant, Natural Resource Manager, Marketing Analyst, Disaster Management and Mitigation Specialists, Watershed Manager, Forestry Researcher, Urbanization Planning, Land Cover and Land Use Change Researcher/Specialist, Environmental Journalist and Geospatial Big Data Scientist. Graduates of this program would be well prepared to refine their skills through a graduate degree or could immediately apply their skill sets within the realm of natural resources and the environment.

3. Succinctly list at least four (4) but no more than seven (7) of the most prominent ***student learning outcomes*** of the program. These outcomes should lend themselves to subsequent review and assessment of program accomplishments.

   1) **Develop basic understanding of various types of geospatial and environmental data and their spatial and temporal dynamics.**

   2) **Learn various technologies involved in data collection, storage and data distribution to the end users including data models and structures to store and organize geospatial and environmental information.**

   3) **Converting data into information for a given environmental problem or related issue.**

   4) **Understand geospatial and environmental issues and technical needs in problem solving in relation to relevant academic, industrial or public services.**

   5) **Demonstrate proficiency in technical skills in geospatial and environmental database design and analysis and the arrangement of things in space and time.**

   6) **Apply critical thinking, problem solving and communication skills to solve problems in professional settings.**

C. Need for the Program

1. *State need.* Briefly describe why the program is specifically needed for the State of Alabama. (State need is considered a priority in the review process.)

Research, education and outreach activities within the School of Forestry and Wildlife Sciences have intensively involved the geospatial and environmental informatics arena, primarily due to the sustainable management of forests, wildlife and the natural resources throughout the State of Alabama. The demands placed on the limited natural resources and growing interest and expertise within the state make SFWS an ideal unit to lead and host the new degree program. The importance of geospatial and environmental informatics in assessing, monitoring and modeling various environmental issues and problems regarding sustainable natural resources is recognized world-wide. This unique, multi-disciplinary program will equip students to contribute to the judicious management of natural resources and well-being of the society in Alabama.

2. *Employment Opportunities.* Based on your research on the employment market for graduates of this program, please complete the following table reporting the total projected job openings (including both growth and replacement demands) in your local area, the state, the SREB region, and the nation. These job openings should represent positions that require graduation from a program such as the one proposed.

Career and College Readiness/Preparation -- Projected Job Openings

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Local	8	10	15	21	29	83
State	85	105	150	210	290	840
SREB	240	300	450	600	850	2440
Nation	1,250	1500	2100	3000	5000	12850

Please briefly describe your methodology for determining employment opportunities – projected job openings. Be sure to cite any data sources used in formulating these projections. The actual survey instrument, detailed results, and associated data file(s) must be maintained internally by the institution for five years from the implementation date. The survey upon which the proposal is based must be available for ACHE Staff examination upon request for that five year timeframe. The survey instrument, detailed results, or associated data file(s) should not be included in the proposal.)

The GIS Industry according to Daratech, a GIS research firm, grew worldwide 10.3% in 2010 to US$4.4 billion with a forecast of an additional 8.3% growth to almost US$5 billion in 2011. According to a new report on the GIS market (Geographic Information Systems (GIS): A Global Outlook released January 2012) from Global Industry Analysts, Inc (GIA), the GIS industry is expected to growth to a worldwide to US$10.6 Billion by 2016. Advanced technologies continue to increase the accuracy and productivity of GIS workers and devices. Therefore, experts expect modest job growth during the next several years. Surveying and mapping technician jobs are expected to grow faster than average.

In addition, the decline in digital technology costs is expected to benefit the employment outlook in all job sectors. GIS technologies were once limited to major companies and federal agencies, has expanded considerably. Now, small companies and government agencies can afford to purchase their own GIS programs and, frequently, bring a GIS professional on board to operate the system. GIS is still a major growth industry and while individual agencies may have staff freezes or layoffs, the rate of adoption of geospatial technology by new agencies continues to grow. In addition, there is a strong consulting segment that continues to grow in order to supply supporting GIS to those agencies. Adoption by commercial enterprises especially in the journalistic, real estate, natural resources and retail industries continues to expand greatly.

According to Daratech which published its GIS/Geospatial Market Report in 2011, the largest demand is for GIS data, which has grown at a compound annual rate of 15.5 percent for the last eight years. Global sales to governmental agencies remains strong with an 7.2 percent compound annual rate over the last 8 years. Of those sales, local government drives the majority of growth as compared to regional and state level government sales. These local governments will be soon looking for employees with GIS degrees to operate their database systems.

The Bureau of Labor Statistics provides freely available industry specific employment statistics as part of its Occupational Outlook Handbook. As part of the 2010-2011 Handbook, the BLS recently deemed that those with GIS related skills have "favorable job prospects" and that employment in those sectors is expected to grow "faster than the average for all occupations". Jack Dangermond, the president of Esri, the leading GIS software company, recently wrote an opinion piece on the positive outlook for careers in the GIS industry, stating that despite the economic downturn, "demand for geospatial technology professionals has grown significantly". In backing up his piece, he cited statistics from the US Department of Labor's High Growth Industry Profile – Geospatial Technology report which noted that the geospatial market is "growing at an annual rate of almost 35 percent, with the commercial subsection of the market expanding at the rate of 100 percent each year."

The US Department of Labor has identified geospatial technology occupations, along with biotechnology and nanotechnology, as one of three emerging industries that will experience continued growth and require additional skilled workforce members in the future (US Department of Labor 2006). Currently, the geospatial technology industry is viewed as having a shortage of qualified professionals and specialists (Gaudet et al. 2003, Mondello et al. 2004). The Society of American Foresters (SAF) is the accrediting body for forestry education in the United States and has identified a recommended curriculum (SAF 2004). Accreditation guidelines require that students should receive instruction in the use of contemporary

electronic technologies and have the "ability to identify and measure land areas and conduct spatial analysis" (SAF 2004).

Childers and Straka (2004) polled 211 members of the Association of Consulting Foresters to assess educational needs for undergraduate forestry students. While technical writing and public speaking skills were the top two subjects that required more emphasis, information technology and GISs were among the top five subjects of importance. Technologies such as GIS and GPS are commonly used by consulting forester firms and competency in these areas often is expected of new hires (Straka and Childers 2006).

Citations:

Childers, D.J. and T.J. Straka. 2004. ACF member assessment of undergraduate forestry educational needs. Consultant 2005:44–46

Gaudet, C.H., H.M. Annulis, and J.C. Carr.2003. Building the geospatial workforce. URISA J. 15:21–30.

Mondello, C., G.F. Hepner, and R.A. Williamson.2004. Ten-year industry forecast, phases I-III, study documentation. Photogrammetry. Eng. Remote Sens. 70:5–58.

Societh of American Foresters (SAF). 2004. Accreditation handbook: Standards, procedures, and guidelines for accrediting educational programs in professional forestry. Bethesda, MD. Available online at www.safnet.org/education/ AccHdbk2004. pdf;

Straka, T.J., and C.J. Childers. 2006. Consulting foresters' view of professional forestry education. J. Nat. Resource Life Sci. Education 35:48–52.

3. *Student Demand - Enrollment projection.* Please briefly describe your methodology for determining enrollment projections. If a survey of student interest was conducted, *please briefly describe the survey instrument, number and percentage of respondents, and summary of results.*

Information on student interest was conducted by an online survey conducted by current SFWS students (N=320) to gauge their interest and determine if the new degree would conflict/compete with their current degree program. Response rate was 15% This 10 question survey included questions like:

How interested would you be in changing from your current degree program to the new GIS degree program? 96% said No, while 4% said they would consider changing majors?

Do you believe this degree would negatively affect your ability to compete for positions in your current degree? 70.8% said No the degree would not affect their ability to compete while, 29.2% said Yes, it might affect their ability to obtain a position.

Do you know of anyone outside of SFWS that might be interested in changing from their current degree program to the new GIS degree program? 55% said Yes they knew of someone who would be interested in the new degree, while 45% said No, they did not know anyone who would be interested.

D. Specific Rationale (Strengths) for Program

What is the specific rationale (strengths) for recommending approval of this proposal? List no fewer than three (3) and no more than five (5) potential program strengths.

1. **School of Forestry & Wildlife Sciences is the flagship program for Natural Resource Management Research in the State of Alabama.**

2. **School of Forestry & Wildlife Sciences has some of the strongest GIS, data collection and analysis and environmental modeling course offerings and faculty research at Auburn University.**

3. **School of Forestry & Wildlife Sciences is the current unit for Climate, Human and Earth Systems Science (CHESS) as part of the Research Initiative at Auburn University. This new program will hire six new faculty teaching and research positions will focus on geospatial education and research.**

Please note that letters of support may be included with the proposal.

Three support letters are attached from the Alabama Cooperative Fish and Wildlife Unit, Resource Management Service (RMS) and Virginia Tech University.

E. Similar Programs

Using the ACHE Academic Program inventory found at http://www.ache.state.al.us/Content/Departments/Instruction/StudentInfo.aspx List below all programs at the same degree level (by institution) that utilize the same 6-digit CIP code as the one being requested in the program proposal.

Also, list any programs at other CIP codes that may be offering similar instruction. If there are no similar programs place a "0/none" by 1. in the listing directly below.

The following institutions offer similar programs at this level:

1. **Auburn University at Montgomery – BS Geographical Information Systems.**

2. **University of North Alabama – BS Geographical Information Systems.**

3. **University of Alabama - offers concentrations in Regional and Urban Planning, Geographic Information Techniques and Human Geography.**

4. **Alabama A&M University offers Remote Sensing and GIS Minor and GIS Certificates program.**

5. **University of Alabama in Huntsville, Earth System Science offers a concentration in GIS/Remote Sensing**

Please add numeration and list additional similar programs, if applicable.

If the program duplicates, closely resembles, or is similar to another program already offered in the State, provide justification for that duplication. Also, if a graduate program, please identify and list any similar programs at institutions in other SREB states.

Justification for similar CIP codes:

The undergraduate degree programs in Geographic Information Systems at Auburn University of Montgomery (AUM) and Geographic Information Science at University of North Alabama (UNA) are designed to serve students preparing for careers in the more technical aspects of applied geography, including the fields of geographic information systems (GIS), remote sensing, computer cartography. The unique aspects of our degree program in GSEI (Geospatial and Environmental Informatics) include: 1) integration of both geospatial technology and environmental informatics, 2) applications of GIS and Informatics Science to natural resources and the environment and 3) temporal dynamics that include changes in the environmental and climate conditions. Students interested in pursuing

Geospatial and Environmental Informatics will be trained in geospatial technology (Geographic information system, remote sensing, photogrammetry, cartography, etc), environmental informatics (Information science, BigData, database management, computer simulation, mathematical and statistical modeling, decision support system, etc) and knowledge in natural resources and environmental science. And students graduated from the program of Geospatial and Environmental Informatics will have an aptitude for spatial and temporal quantitative analysis, database management, environmental modeling and computer simulation, and decision support with applications for monitoring and managing natural resources such as forests, wildlife, water and the environment.

Environmental decision making requires unique tools, approaches, and expertise. As scientific understanding of the complex nature of human-environment relationships improves, the effective application of this knowledge requires in-depth quantitative skills in analyzing spatially- and temporally defined, multi-layered, multi-scale data from many sources. The term that has emerged for this specialized field of knowledge is geospatial environmental informatics, GSEI.

This proposed degree, Geospatial and Environmental Informatics is the application of information science to environmental management. As such, it includes aspects of geographic information science (GIS), mathematical and statistical modeling, remote sensing, database management, knowledge integration, and decision science. Professionals with skills in these areas are needed to assist scientists and managers with the challenges of collecting, collating, modeling, analyzing, visualizing, and communicating information in support of environmental decision making.

Geospatial Environmental Informatics, as a field of study, has been around for more than a decade. An Internet search reveals just a few undergraduate programs in geospatial environmental informatics within computer science departments at UC Irvine, VT and UNLV in the US, and at the National Taiwan Ocean University in Keelung, Taiwan. Thus, while this newly proposed degree program shares a similar CIP code with Auburn University Montgomery and University of North Alabama, this proposed degree program uses GIS only as a part of the overall curriculum model and would not be a 1-1 duplication or overlap.

A successful undergraduate program in geospatial environmental informatics should integrate quantitative topics such as modeling, statistics, decision science, geographic information science, and remote sensing, with a strong foundation in natural resource management and environmental conservation. Therefore, this degree program has a number of courses on GIS, remote sensing, data collection, statistical analysis, environmental modeling, geography and natural resource policy and management courses.

Auburn University offers recognized strengths in all of these areas and has longstanding programs providing courses in information management, information technology, computer science, statistics, geographic information science, and remote sensing. The School of Forestry and Wildlife provides a strong springboard for the integration of the fields of biometrics and geomatics with a wide array of disciplines on campus. In addition, the SFWS has the critical mass of faculty expertise to advise and mentor students in quantitative aspects of natural resource management.

F. Collaboration With Other Institutions/Agencies

Does the institution plan on collaborating with other institutions in the delivery of this program?

[ ] Yes No [x]

If yes, please indicate below which institutions and describe the basis of this collaboration.

If no, please indicate your reasons why.

SFWS will accept credit for equivalent courses taken at other institutions and teaching faculty will interact across departments, especially COMP and GEOL, however, we are not planning any formal collaboration with other institutions at this time.

G. Curriculum

1. Program Completion Requirements: (Enter a credit hour value for all applicable components, write N/A if not applicable)

Credit hours required in major courses	__ 33 ___
Credit hours required in minor	___ 0 ___
Credit hours in institutional general education or core curriculum	__ 42 __
Credit hours required in support courses	__ 24 __
Credit hours in required or free electives	__ 21 ___
Credit hours for thesis or dissertation	__ 0 ___
Total credit hours required for completion	__**120**____

2. Will this program be related to other programs at your institution?

No.

If so, which ones and how?

3. Please identify any existing program, option, concentration or track that this program will replace at your institution.

The Geospatial and Environmental Informatics degree at Auburn University is unique and not directly related to other degrees at the institution. However, it may draw students from other departments that have an interest in the geospatial analysis of environmental aspect of GIS, remote sensing, geography and computer science.

4. Is it likely that this program will reduce enrollments in other graduate programs at your institution? If so, please explain.

No, this new degree is not part of a graduate program.

5. If this is a graduate program, please list any existing undergraduate programs at the institution which are directly or indirectly related to the proposed graduate program. If this is a doctoral proposal, also list related master's programs at your institution.

NA. Not a graduate program.

6. Please complete the table below indicating the proposed program's courses. Include the course number, and number of credits. (If feasible/useful, please group courses by sub-headings within the table.)

Course Number and Title	**Number of Credit Hours**	***If New Course**
Freshman Year		
ENGL 1100 & 1120 English Composition I & II	6	
BIOL Principals of Biology & Lab 1020/1021 & 1030/1031	8	
MATH 1610 Calculus I	4	
GEOG 1010 Global Geography	3	
COMP 1200 Intro Computing for Engineers and Scientists	2	
GSEI 1200 Digital Earth	3	*
FOWS 2060 Intro Forested Landscapes	2	*
STAT 2010 Statistics for Social and Behavioral Sciences	3	
Sophomore Year		
GSEI 2070 Intro Environmental Informatics	3	*
ECON 202 Principals of Microeconomics	3	
HISTORY or LITERATURE CORE	6	
COMP 2000 Network Programming with HTML and Java	3	
FOWS 2020 Natural Resource Sampling Techniques	3	
SOCIAL SCIENCE CORE	3	
HUMANTIES CORE	3	
GEOG 2020 Physical Geography	3	
Free Elective	3	
Junior Year		
FORY 5470 GIS Applications in Natural Resources	2	
GEOG 5820 Aerial Photography & Remote Sensing	4	
COMM 1000 Public Speaking	3	
ENGL 3040 Technical Writing	3	
FORY 5480 GIS Database Design and Analysis	2	
FORY 4230 Forest Ecology	3	
COMP 3000 Programming for Engineers and Scientists	3	
GSEI 5150 Spatial Statistics in Natural Resources	3	*

Free Elective	3	
Senior Year		
FOWS 5220 Landscape Ecology	3	
GEOG 5880 Advanced GIS	3	
GSEI 4360 Environmental Modeling	3	*****
ECON 3100 Law & Economics	3	
GSEI 4430 Applications in Environmental Informatics	3	*
FOWS 5320 Environmental Services	3	
FOWS 5880 Ecological Economics	3	
FOWS 5270 Natural Resource Policy	3	
FORY 5250 Wetland Ecology and Management	3	
Free Elective	3	

7. Enumerate and briefly describe any additional requirements such as preliminary qualifying examination, comprehensive examination, thesis, dissertation, practicum or internship, some of which may carry credit hours included in the list above.

There will be no additional requirements or examinations needed for this degree other than Auburn University's current application guidelines.

8. Does the program include any options/concentration. If so, please describe the purpose and rationale and list the courses in the option.

No options or concentrations will be required or offered for this degree program.

H. Program Review and Assessment

In the final analysis, the institution and its governing board are accountable for the quality, utility and productivity of this and all other programs of instruction. With this in mind, please describe the procedures that will be used in assessing the program's outcomes. Be sure to include:

1. An assessment process for the student learning outcomes;

Student Learning Outcomes	Assessment	Results
Develop basic understanding of various types of geospatial data and data models and their spatial and temporal dynamics.	Geospatial and environmental data sets and models will be used to assess knowledge gains through course assignments and pre/post exams.	
Learn various technologies involved in data collection, storage, and data distribution to the end users including data models and structures to store and organize geospatial and environmental information.	Assess the proficiency gained in GIS, remote sensing and other data related technologies through course assignments and pre/post exams	
Converting data into information for a given environmental problem or related issue	Evaluation of the report from the Final Year Capstone Project work	
Understand geospatial and environmental issues and technical needs in problem solving in relation to relevant academic, industrial or public services.	Students' knowledge and preparation in geospatial and environmental issues will be assessed through a position performance rubric.	
Demonstrate proficiency in technical skills in geospatial and environmental database design and analysis and the arrangement of things in space and time.	Database design assessment will be through course assignments, specific test questions and pre/post degree exams	
Apply critical thinking, problem solving and communication skills to solve problems in professional settings.	Communication and critical thinking skills will be assessed through writing assignments and oral presentations using a rubric evaluation method.	

2. A follow-up plan to determine accomplishments of graduates such as obtaining relevant employment or being admitted to a masters or doctoral program (graduate or professional).

All graduating students from SFWS are currently surveyed before they leave Auburn University (FORY, WILD, NATR) concerning their employment and collect their contact information to build an active alumni support group. In addition, all graduates are asked to evaluate the strength and weaknesses of our curriculum and degree program. This survey process will continue for the GSEI students with information used to improve/modify/amend the degree program over time as needed.

Graduates employability in terms of median salary, type of employment, and/or admission to the graduate program will be compared with the outcome from similar program in the state of Alabama.

I. Accreditation

If there is a recognized (USDE or CHEA) or other specialized accreditation agency for this program, please identify the agency and explain why you do or not plan to seek accreditation. If there is no accrediting or similar body for this degree program state as such in your response.

There is no recognized accreditation agency that the Geospatial and Environmental Informatics degree would fall under. However, many of the courses taught within SFWS as part of this new degree program fall under either the Society of American Foresters and Wildlife Federation, of which are part of an accreditation body currently in use within the SFWS.

J. Instructional Delivery Method

1. Describe which instructional delivery methods will be utilized in delivering this program.

This degree will be traditional lecture and laboratory (computer) courses at Auburn University. However, some of the AU required core courses may fall under the "flipped classroom" pedagogy of instruction that focuses on experiential and inquire-based learning.

2. If distance technology is being utilized, indicate an approximate percent of the total program's courses offered that will be provided by distance education__5_____ %

Auburn University will accept either core courses or elective courses that fall under the course equivalency.

3. If distance education is not being utilized, please explain why not.

The large number of hand's-on GIS, remote sensing, meta-data analysis and field-based laboratories associated with the required courses in this proposed degree make it difficult to conducted under a distance education format.

K. Resource Requirements

1*. Faculty.* Do not attach the curriculum vitae of each existing or additional faculty members to this proposal. (The institution must maintain and have current and additional primary and support faculty curriculum vitae available upon ACHE request for as long as the program is active.) *Please do provide a brief summary of Faculty and their qualifications specific to the program proposal.*

Dr. Susan (Shufen) Pan – is currently an Assistant Professor & Director The GIS and Remote Sensing Laboratory and International Center for Climate and Global Change Research at the School of Forestry and Wildlife Sciences, PhD, Ecology, Auburn University & University of Chinese Academy of Sciences, 2014. Dr. Pan's area of interest includes Monitoring, Assessment and Prediction (MAP) of coupled natural-human systems at multi-scales from landscape, watershed, regional, continental and global in the context of global environmental change. She has more than 20-year experience in geospatial analysis and environmental informatics. By using emerging technologies in geospatial modeling, satellite observation and Big Data, Dr. Pan intends to provide geospatial decision support for solving a range of cutting-edge issues including climate change impacts, mitigation and adaptation, social-ecological system dynamics, land use and land cover changes.

Dr. Hanqin Tian- is currently the Director & Dixon Professor International Center for Climate and Global Change Research at SFWS, PhD State University of New York, 1996. Dr. Tian specializes in land surface and ecosystem modeling, terrestrial carbon and nitrogen cycles, and biogeochemical and hydrological cycles at the land-ocean interface. He has over 20-year experience in developing and applying terrestrial ecosystem models and satellite observation for understanding and quantifying land system dynamics and its interactions with atmosphere and ocean. His work in the terrestrial carbon cycle and greenhouse gas emission is at the leading edge of the field. He has extensive experience in developing and conducting interdisciplinary research project.

Dr. Lisa Samuelson- is currently an Alumni and Dwain G. Luce Professor of Forestry at SFWS, PhD Virginia Tech University, 1992, Forestry. Her current research includes the ecophysiology of forest trees and the

examination of the ecosystem carbon density and allocation across a chrono-sequence of longleaf pine forests in the southeastern USA. Some of this research has allowed the partitioning longleaf pine soil respiration into its autotrophic and heterotrophic components through root excision that has determined the diurnal and spatial variability of growing season soil respiration in longleaf pine forests.

Dr. Larry Teeter- is a Professor of Forest Economics at the School of Forestry and Wildlife Sciences, Ph.D. Forest Economics, Colorado State University, 1985. Dr. Teeter's teaching responsibilities at Auburn have included undergraduate courses in Forest Management and Forest Policy, a graduate course in Forest Economics, and 2 courses in Geographic Information Systems. His research with GIS and environmental informatics includes the Economic Impact of Working Waterfronts in the Alabama Coastal Economies: An Input-Output Analysis, the Social and Economic Impacts of Timberland Sales by the Forest Products Industry in Alabama, and the effects of Biomass on the forest-based Economic Development Option for the Rural South, Alabama.

Dr. Joseph Fan – is an Associate Professor of Forestry at the School of Forestry and Wildlife Sciences, Ph.D., Quantitative Silviculture, 1995. Dr. Fan's research encompasses meta-data analysis that incorporating Local Statistics Based Spatial Weight Matrix into Simultaneous Autoregressive Model to Predict the Distribution of Non-native Invasive shrubs in the Upper Midwest, predicting the efficacy of even- and uneven-aged management to promote oak regeneration in the Missouri taking into account site and stand factors, documenting the influence of precipitation and consecutive dry days on burned areas in Yunnan province, and estimating forest inventory sizes for timber sales from easily observed stand attributes.

Dr. Sanjiv Kumar - is an Assistant Professor at SFWS, Ph.D., Purdue University, 2011, School of Civil Engineering (Hydroclimatology) His current research interests include Hydroclimatology, Hydrological processes in climate models, effects of climate change and land use change on water resources, land-atmosphere interactions and feedback, long-term trend and persistence phenomenon in hydroclimatic data, regional climate variability and change. Other research includes Global climate model evaluations, climate analysis, land surface modeling using community land model (CLM), watershed modeling using soil and water assessment tool (SWAT), Geographic Information System (GIS), nonparametric trends and long-term persistence analysis, NCAR Command Language (NCL), parallel computing using matlab, high-performance computing for climate model simulation on NCAR Yellowstone machines.

a) Please provide faculty counts for the proposed program:

Status	Faculty Type	
	Primary	Support
Current- Full Time	**6**	
Current-Part Time	**0**	
Additional-Full Time (to be hired)	**0**	
Additional-Part Time (to be hired)	**0**	

b) Briefly describe the qualifications of new faculty to be hired.

NA

2. Equipment. Will any special equipment be needed specifically for this program?

[ ] Yes [x] No

If "Yes", please list:

The cost of the new equipment should be included in the table following (Section K.).

3. Facilities. Will any new facilities be required specifically for the program?

[ ] Yes [x] No

If "Yes", please list. Only new facilities need be listed. Their cost should be included in the table following (Section K.).

4. Library. Are there sufficient library resources to support the program?

[x] Yes [ ] No

Please provide a brief description of the current status of the library collections supporting the proposed program.

The Ralph Brown Draughon Library is named in honor of Dr. Ralph Brown Draughon, president of Auburn University from 1947 to 1965, and a moving force behind the construction of the original portion of the Library. With the

completion of a 207,000 square foot addition in 1991, the Library has a seating capacity of 2,500 designed to serve the study, teaching, and research needs of Auburn students, faculty, and staff.

The combined collections of the Auburn University Libraries contain over 3 million volumes as well as 2.6 million government documents, 2.5 million microforms, and over 148,000 maps. The Libraries receive over 35,000 current periodicals, many which are available online. The library also provides access to over 227 electronic databases and has over 10 million archival and manuscript items.

If "No", please briefly describe how any deficiencies will be remedied; include the cost in the table following (Section K.).

5. Assistantships/Fellowships. Will you offer any assistantships specifically for this program?

[ ] Yes [x] No

If "Yes", how many assistantships will be offered? Be sure to include the amount in the table following.

[ ]

Number of assistantships offered

Be sure to include the cost of assistantships in the table following (Section K.).

6. Program Budget .The proposal projected that a total of $ [$ 0.0] in estimated new funds will be required to support the proposed program.

A projected total of $ [$1,118,346] will be available to support the new program.

L. New Academic Degree Program Proposal Summary Form

- In the following "NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY" table, please provide a realistic estimate of the costs of the program.
- This should only include the additional costs that will be incurred, not current costs.
- Indicate the sources and amounts of funds available for the program's support.

- DO NOT LEAVE ANY PORTION/SOURCES OF THE NEW FUNDS OR FUNDS AVAILABLE BLANK. ENTER "$0" IF THERE ARE NO NEW FUNDS NEEDED OR NO FUNDS AVAILABLE.
- THERE MUST BE AN ACTUAL DOLLAR AMOUNT PROVIDED FOR TUITION, SINCE THOSE FIGURES REPRESENT PROJECTED ENROLLED STUDENTS.

- If it is stated that new funds are requested or if it is a reallocation of resources, please explain directly below from what source(s) the funds for the proposed new program, (e.g. faculty, equipment, etc.) will be attained.

- If tuition is used to support the program, what start-up revenue source will be used to initiate the program.

Also, include enrollment and completer projections.

- New enrollment headcounts are defined as **unduplicated** counts across years. For example, if "Student A" would be initially enrolled in the program in year 2, and again is enrolled in the program in years 4 and 5; "Student A" is only counted in the new enrollment headcount in year 2.

- Total enrollment headcounts represent the actual number of students enrolled (both part-time and full time each year. This is a **duplicated** count).

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

INSTITUTION: Auburn University

PROGRAM: Bachelor of Science – Geospatial and Environmental Informatics (GSEI)

ESTIMATED NEW FUNDS REQUIRED TO SUPPORT PROPOSED PROGRAM

	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
FACULTY	$0	$0	$0	$0	$0	$0
LIBRARY	$0	$0	$0	$0	$0	$0
FACILITIES	$0	$0	$0	$0	$0	$0
EQUIPMENT	$0	$0	$0	$0	$0	$0
STAFF	$0	$0	$0	$0	$0	$0
ASSISTANTSHIPS	$0	$0	$0	$0	$0	$0
OTHER	$0	$0	$0	$0	$0	$0
TOTAL	$0	$0	$0	$0	$0	$0

SOURCES OF FUNDS AVAILABLE FOR PROGRAM SUPPORT

	Year 1	Year 2	Year3	Year 4	Year 5	TOTAL
INTERNAL REALLOCATIONS	$0	$0	$0	$0	$0	$0
EXTRAMURAL	$0	$0	$0	$0	$0	$0
TUITION	$53,480	$118,040	$199,060	$306,606	$441,160	$1,118,346
TOTAL	$53,480	$118,040	$199,060	$306,606	$441,160	$1,118,346

ENROLLMENT PROJECTIONS AND DEGREE COMPLETION PROJECTIONS

Note: "New Enrollment Headcount" is defined as unduplicated counts across years.

	Year 1	Year 2	Year 3	Year 4	Year 5	5-YEAR AVERAGE
FULL TIME HEADCOUNT	10	12	15	20	25	16
PART TIME HEADCOUNT	0	0	0	0	0	0
TOTAL HEADCOUNT	10	22	37	47	72	37
NEW ENROLLMENT HEADCOUNT	10	12	15	20	25	16

						AVERAGE
DEGREE COMPLETION PROJECTIONS	0	0	5	10	12	9