Program Review

Environmental Science

College of Science

October 2005

MARSHALL UNIVERSITY
Date: 10/16/05

Program: Environmental Science

Recommendation

Marshall University is obligated to recommend continuance or discontinuance of a program and to provide a brief rationale for the recommendation.

Recommendation Code(#):
1. Continuation of the program at the current level of activity; or
2. Continuation of the program with corrective action (for example, reducing the range of optional tracks or merging programs); or
3. Identification of the program for further development (Please be specific; identify areas and provide a rationale in your request); or
4. Continuation of the program at the current level of activity, with the designation as a program of excellence (See Series 11 Statement from the Policy Commission); or
5. Discontinuation of the program (Procedures outlined in HEPC Administrative Bulletin 23).

Rationale for Recommendation: (Deans, please submit the rationale as a separate document. Beyond the College level, any office that disagrees with the previous recommendation must submit a separate rationale and append it to this document with appropriate signature.)

Recommendation: Signature of person preparing the report: Date:

Recommendation: Signature of Program Chair: Date:

Recommendation: Signature of Academic Dean: Date:

Recommendation: Signature of Chair, Academic Planning Committee: (Baccalaureate pgms only) Date:

Recommendation: Signature of President, Faculty Senate/ Chair, Graduate Council: Date:

Recommendation: Signature of the Provost and Senior Vice President for Academic Affairs: Date:

Recommendation: Signature of the President: Date:

Recommendation: Signature of Chair, Board of Governors: Date:
College/School Dean’s Recommendation

Deans, please indicate your recommendation and submit the rationale.

Recommendation: Continue at present level.

Rationale:
(If you recommend a program for further development identify all areas for specific development; if you recommend a program as a program of excellence address all criteria listed in HEPC Series 11)

During the short span existence of the Environmental Science has existed within the Integrated Science Department it has grown, flourished, and emerged as a very significant program. Originally the program had no full time faculty and was supported by instructors drawn from several departments. There was no appreciable resource stream or space allocation to support the development of the fledgling program. At considerable sacrifice and without additional budgetary allocation funding was redirected from the College of Science and the Integrated Sciences program to Environmental Science resulting in the hiring of dedicated faculty, well equipped laboratory space, excellent curriculum, and the development of a critical-thinking learning environment. As a result Environmental Science students are not linear thinkers. They learn to use knowledge from many areas brought to bear upon observations to assess situations, engage in systematic reasoning, and critical thinking enabling them to solve problems.

The input from the advisory board and the frequent evaluation of the program by external reviewers has influenced curricular decisions favorably impacting preparation of students for employment. As a testament to the success of the program 28 of the 32 graduates during this review period have been tracked with a significant number completing graduate degrees and a large majority of the remainder gaining employment in field. Employer satisfaction with the skill sets of Environmental Science students serves to emphasize the success of students not only in impressing employers during the interview process but to their value in the workplace.

Within five years the program has grown much stronger and is poised for growth provided the budgetary resources and faculty positions needed to support this very important area are forthcoming.

Signature of the Dean: [Signature]

Date: Nov 21, 2005
Marshall University  
December 20 2005

Program: Environmental Science  
College: Science

Date of last Review: July 21, 1998 (2 year review)

I PROGRAM DESCRIPTION

The Environmental Science Baccalaureate Degree Program (ES BS) at Marshall University prepares students for careers in which sound scientific practices are applied to environmental monitoring and impact assessment. The effective integration of scientific operations into analysis and resolution of environmental problems has enabled graduates to obtain jobs with state and federal regulatory agencies and private consulting firms. A number of graduates have earned or are pursuing graduate degrees in the traditional sciences, in environmental assessment, policy and/or engineering.

In November 1994, then Marshall University President, Dr. J. Wade Gilley charged the Center for Environmental, Geotechnical, and Applied Sciences (CEGAS) with the task of directing the development of an undergraduate degree in Environmental Science. A committee including faculty from the College of Business, College of Science (COS), and CEGAS was chaired by Dr. Tony Szwilski. Dr. Gilley received notice of approval of this program from the Chancellor of the University System of West Virginia in July of 1996. At the time the College of Information Technology and Engineering did not exist and Dr. Gilley housed the ES BS degree program in the College of Science. COS Dean Storch assigned further curricular development and student placement in ES BS to the Integrated Science and Technology Department (IST) after determining the programs had compatible goals and philosophies.

At the time of the transfer of the ES BS program to the IST Department, the IST Department was instructed to develop the “Environmental Assessment and Policy” Area of Emphasis in the Integrated Science and Technology Major (IST EAP) modeled after a similar program in the IST Program at James Madison University.

As a result, the faculty of the Integrated Science and Technology Department had the responsibility of managing two undergraduate programs with an environmental focus.

The initial outlay of resources including space, material and faculty support was directed to support the largest population of students. Because the majority of students knew the name “environmental science” and enrolled there, staff and material resources were primarily allocated to ES BS students.
II ACCREDITATION INFORMATION
Specialized accreditation traditionally has not been pursued for these types of programs, and is not currently planned for the ES BS degree program.

III PROGRAM STATEMENT
A ADEQUACY
1 Curriculum:
A survey of prospective employers was conducted prior to the development of the IST program; an advisory team of four experts in the environmental field reviewed the ES curriculum early in its development, three years after implementation of ES in IST; two prominent Environmental Scientists reviewed the entire environmental studies program of IST, including ES BS; a team of faculty and administrations from James Madison University conducted a site visit of IST and ES programs. This process has reaffirmed that thorough course knowledge must be supplemented with a capacity to think critically and creatively and communicate the results of these thought processes effectively.

The Environmental Science Degree Program is an integrated program that requires math, communication, and environmental studies courses from the Integrated Science and Technology Department, along with science courses from Geology, Biology, Chemistry and Physics, and courses to satisfy general education requirements for Art, Humanities, Literature and Social Sciences. Transfer students with prior college experience are given credit for appropriate courses if the course content, title, and descriptions are equivalent. Students must consult with the ES BS program Director (Dr. Michael Little) each semester before registering.

Required courses ES BS program (matches 2005-2007 Undergraduate Catalog):
Communications sequence (12 hrs):
- IST 101 students learn written and oral communication in science and technology
- IST 120 students learn about science and technology’s impact on society
  Taken as co-requisites two courses (6 hrs) equal ENG 101 and CMM 103.
- IST 201 students learn communication in business, is equivalent to ENG 102
- IST 220 continues IST 120 with further work in science and technology’s impact

Analytical Methods sequence (12 hrs):
- IST 130: Analytical Methods I
- IST 131: Analytical Methods II: Integral Calculus
- IST 230: Analytical Methods III: Differential Calculus
- IST 231: Analytical Methods IV: Linear Algebra/Differential Equations

A critical component of an Environmental Science degree is a thorough understanding of scientific content and how it is used in the scientific method. Environmental Science is not merely a discipline that examines environmental problems and solutions for them but is a science and as such students must learn to think and operate as scientists.

Basic Science requirement (23 hrs): To provide basic scientific content, all ES students are required to complete introductory biology, chemistry and geology
sequences (CHM 211-212 and 217-218, BSC 120, IST 212 or PHY 201, GLY 200).
- BSC 120: Principles of Biology
- GLY 200: Physical Geology
- CHM 211: Principles of Chemistry I and CHM 217: Principles of Chemistry Lab I
- CHM 212: Principles of Chemistry II and CHM 218: Principles of Chemistry Lab II
- IST 212: Energy (physics of energy production and distribution) or PHY 201
- IST 160: Intro to Programming or IST 260: Instrumentation II

Upper Level Science Block (16 hrs) Chemistry, Biology, Geology or Physics.
ES BS students must complete 16 hours of complementary upper level science courses, chosen in consultation with the program director.

Environmental Science Core sequence (27 hrs) begins in the third year when students learn the applied skills and knowledge required for environmental work.
- IST 320 students utilize critical thinking to analyze environmental problems
- IST 321 students use project planning to remedy environmental problems
- IST 322 students use digital imagery to analyze vegetative and landform patterns
- IST 323 students use dynamic models of lentic, lotic, and wetland systems to assess quality of aquatic systems
- IST 301 Public Service, 1 credit 30 hour community volunteer experience
- IST 423 students learn to store and use environmental information digitally
- IST 424 students apply principles from the National Environmental Protection Act (NEPA) to treatment of local environmental problems.
- IST 490 Senior Project I, first semester of capstone experience
- IST 491 Senior Project II, second semester of capstone experience
The six hour Senior Project sequence (IST 490 and 491) in which students plan, develop, and complete a scientific study of a local environmental problem individually or as part of a team while closely supervised by a faculty sponsor.

Environmental Studies elective courses (6-8 credit hrs)
Recommend IST 428: CAD and Terra Modeling,* IST 435: Biomonitoring.*
*Courses currently offered as special topic courses and are under review by the COS curriculum committee to become permanent courses. Other electives include IST 420: Remote Sensing and IST 421: Digital Image Processing.

General Education Course Block (18 hrs)
Social science (9 hrs), Art/Music/Theater Appreciation (3 hrs), Literature (3 hrs), Humanities (3 hrs) chosen to fulfill Marshall Plan requirements.

Elective coursework (12-15 hrs)
Recommend students complete a minor chosen in consultation with advisor.

Differences between the BS ES Degree Program and IST EAP Area of Emphasis
The focus of the Environmental Assessment and Policy (EAP) Area of Emphasis in IST is the analysis of data generated by environmental and social scientists through use of...
technology such as GPS (Global Positioning Systems, a tool to pinpoint locations), GIS (Geographic Information Systems, a mapping program), CAD (Computer Aided Design, a drafting application) databases and computer software. As ES BS uses similar technologies and resources it makes sense for the programs to be administered by IST.

1) ES BS requires a 16 hour block of complementary upper level science courses.  
2) ES BS students are not required to complete a modern foreign language sequence, students in IST EAP Area of Emphasis are required to complete the 204 course.  
3) IST EAP requires 12 hours in PSC, ECN, BUS, MGT chosen with program advisor. The two programs (ES BS and IST EAP) are complementary rather than duplicative. The educational missions are different: ES BS is an applied science program with an environmental focus, while IST EAP exposes students to methods of environmental assessment, the consequences of environmental decisions, and the associated policies.

The ES BS program has been strengthened with the inclusion of the “Communications” and “Analytical Methods” course sequences from IST, course work in computer and technology applications, the IST environmental core, and the intensive research experience taken from the Senior Project experience. Students also have access to the broad range of IST courses in Computer Information Technology and Biotechnology. These disciplines provide ES students with the opportunity to develop skills and knowledge on topics such as programming and database management from the CIT curriculum as well as DNA typing and gene cloning from Biotechnology.

2 Faculty: The faculty members who teach the environmental sequence of IST courses include three tenured Professors, two teach part time in the program. Two non-tenure track faculty members who have significant professional expertise also teach in Environmental Science. 50% of full-time ES BS faculty members are tenured.

Dr. Michael Little is a tenured full time faculty member. He is the Chairperson of the IST Department, and functions as the director of the ES Program. He teaches IST 322, 323, 423, 461, and Special Topics, Public Service and Independent Study courses.

Little’s initial research with Dr. John Wiley of East Carolina University School of Medicine, tracked mobile genetic elements through the genomes of tree frogs. With Dr. Tom Pauley of Marshall University he studied salamanders as bioindicators of acidification and insecticide use. Little served for two years as a Research Associate with the West Virginia District of the US Geological Survey, Water Resources Division. As the 2002 Drinko Fellow he worked with a group of undergraduate and graduate students sequencing a portion of the mitochondrial genome in a rare Appalachian fish.

Dr. Tom Jones is a full time non-tenure track faculty member assigned to the IST Department jointly funded by Marshall University and by Rahall Transportation Institute. Dr. Jones teaches IST 111 Living Systems and the special topics IST course in Biomonitoring as well as courses in ISC for non science majors. Dr. Jones has worked extensively with ES undergraduates on environmental projects including: Mussel surveys along with Dr. Ralph Taylor for $330,000; Ecological Assessments for the U.S.
Army Corps of Engineers for $88,000; Biomonitoring and fish utilization on Kanawha and Ohio Rivers for $50,000; Benthic Insect Identification for $40,000; GIS and database used to identify sampling locations for a rare crayfish for $6,000.

Dr. Ralph Taylor is a tenured full professor who teaches part time in the IST Department. Dr. Taylor has extensive experience in aquatic research and is a world authority in the taxonomy and ecology of unionid mussels. Taylor is former chair of the IST department and still works extensively with ES undergraduates on funded research.

Mr. Sam Colvin is a full time, one year temporary faculty member who is the instructor for the IST 320 and 321 course sequence that focuses on the nature of environmental problems and their remedies. He graduated from WVU with a Bachelor’s and Master’s degree and has taken additional courses in land use planning, waste management, real estate appraisal, real estate law, and construction. In college he served as West Virginia’s youth advisor to the U.S. Environmental Protection Agency.

Mr. Colvin was the Executive Director of the Solid Waste Management Board for 11 years under Governors Rockefeller, Moore and Caperton and participated in feasibility studies, facility planning, and bond financing for environmental projects. He has also served on the West Virginia Water Quality Advisory Committee, as the Executive Director of the Ohio River Basin Consortium for Research and Education; and as Community Development Director for the City of Huntington performing environmental assessments for projects funded by grants and has helped organize several statewide environmental conferences. He has obtained grants for waste reduction projects, landfill end use, recycling programs, composting, and stream restoration and has testified as an expert witness before judicial, regulatory and legislative hearings.

Dr. Jagan Valluri is a Professor of Biological Sciences with extensive experience in NEPA compliance and Regulatory Analysis. He teaches the Environmental Risk Assessment course (IST 424) in the Integrated Science and Technology Department. He helped secure several E.P.A Environmental Internships for Marshall students and in the placement of two students at the GS-12 positions at U.S. Army Corps of Engineers. Dr. Valluri has served as a consultant for the Environmental Analysis Branch at the U.S. Army Corps of Engineers, Huntington District in West Virginia. Dr. Valluri’s association with the U.S. Army Corps of Engineers and Department of Energy during the past 12 years has focused on developing effective methods for identifying ecological effects of major Federal actions and in the preparation of Environmental Impact Statements and Assessments. His ecosystem risk assessments have evaluated multiple levels of biological organization, ranging from microbial to riparian effects.

3 Students:
  a Entrance Standards: Students must meet the minimum requirement for entrance into the Marshall University College of Science. This requires minimum ACT scores of 21 in the quantitative portion and a minimum of a 21 composite score. SAT equivalents are 510 in Math and 980 composite. Students with an ACT deficiency can be fully admitted to the COS and ES BS program by earning a minimum grade of “C” in
ENG 101 and MTH 127/130 (College Algebra) course as appropriate. Transfer students may meet a combination of the requirements for verbal and quantitative skills (See Table I).

b Entrance Abilities: ACT scores for students in the ES BS program are between 19-22 on math and 19-24 on composite between May of 2001 and May 2005. Student’s entrance abilities have improved during the period of IST management.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Composite</th>
<th>Average Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1997</td>
<td>20.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Fall 1998</td>
<td>23.2</td>
<td>21.9</td>
</tr>
<tr>
<td>Fall 1999</td>
<td>21.8</td>
<td>20.46</td>
</tr>
<tr>
<td>Fall 2000</td>
<td>19.0</td>
<td>17.8</td>
</tr>
<tr>
<td>Fall 2001</td>
<td>20.5</td>
<td>21.5</td>
</tr>
<tr>
<td>Fall 2002</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Fall 2003</td>
<td>24.3</td>
<td>23.4</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>23.6</td>
<td>21.8</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>23.5</td>
<td>22.2</td>
</tr>
</tbody>
</table>

Prior to the management of ES BS by IST (Fall 1996-Spring 2000), 12 met ACT minimum cutoff and 25 did not. When program was under IST management (Fall 2001-Fall 2005) 25 met ACT minimum cutoff and 20 did not. Even though many students did not meet the COS minimum requirements for ACT scores, the strong commitment to advising and teaching has resulted in them being successful in the program.

c Exit Abilities: In May 2001, GPA’s of the 7 graduates averaged 2.69, trended upward in May 2002 with 5 graduates averaging 2.93 and then averaged 2.65 to 2.69 from May 2003-August 2004. GPA’s have trended upwards with Dec. 04 graduates averaging 3.02 GPA and May 05 graduates average 3.2 GPA (See Table II).

4 Resources:
a Financial: When management responsibility for the Environmental Science BS program was given to the IST Department, no additional allocations of faculty, staff, or facilities were made. The IST Departmental Budget is a special budget allocation from the West Virginia State Council for Economic Development. In addition, budget funds for IST are generated by university lab fees and from a special IST Tech Fee. Since the assignment of the management of ES BS to IST, significant financial, faculty, and staff resources from the IST Department have been diverted to support the ES BS Program. ES BS students are within the IST Department, are enrolled in IST classes, and pay fees assessed on IST students. ES BS students qualify for full funding from IST financial resources. Funding is directed to ES BS classes and students to support laboratory experiences in their course work and support expenses on Senior Project I and II. $110,000 from the IST departmental budget over the five year review period and over $10,000 from lab and tech fees have been expended to support ES BS
students.

As a result, significant instrumentation has been purchased, space renovated, and faculty reassigned to support ES BS. Equipment purchases include $13,000 in GPS instrumentation used to geoposition study sites, $12,000 in total station and support materials needed to survey study sites, $45,000 in computer compatible material needed to measure water quality parameters, and a $22,000 shock boat for fish surveys in big rivers. Resources have been obtained from IST, Rahall Transportation Institute (RTI), and university resources as well as through grant work with government and private agencies. ES BS undergraduates have been significantly involved in grant and contract work and have received over $87,000 in environmentally related work stipends.

The subject matter used for both ES instruction and application in the work place is associated with standards set by government regulatory agencies and are published by such entities as the US Department of the Interior, US Park Service, and US Corps of Engineers. These are readily available from either Government Documents or by web delivery. Other research level documents are available by EBSCOHOST or elsewhere. Text holdings in MU’s Library from Geology and Biology Departments are widely used.

b Facilities: When management of the ES BS program was given to the IST department, the only facility for ES BS was a temporary laboratory in the former office complex in the basement of Morrow Library. ES BS and IST EAP now share:

- A totally renovated instructional laboratory in Morrow G18. Facilities for 20 students, including microscopy and data projector systems.
- Renovated instrumentation laboratory in Morrow G31. 16 PC computers for GIS, CAD, LABVIEW, and statistical analysis, 8 computers interfaced with sensors and data-loggers, apparatus for DNA and protein electrophoresis.

ES BS students and the IST EAP program have access to IST’s computer facilities: Morrow Learning Commons with space and facilities for student collaboration with colleagues, faculty, and technical staff.

- Computer lab especially equipped for GIS and CAD instruction (Morrow 119).
- Two fully equipped computer labs (Prichard Hall 200, Morrow 122)

5 Assessment Information:

a Summarize the principal elements of the program assessment plan:
Curriculum content, student learning, and faculty effectiveness are all assessed. The effectiveness of the curriculum is assessed through frequent contact with employers of graduates and professionals in the environmental science field. To develop the curriculum for environmental science and environmental assessment and policy, the faculty of the IST Department formed an Advisory Committee of professionals in the fields of environmental science, assessment, and policy.

- Dr. Thomas Schuyler, Senior Research Scientist with the US Forest Service
- Dr. Hugh Bevins, Division Chief of Water Resources US Geological Survey
• Walt Kordek, Director of Operations for Research WV DNR
• Dr. Frank Borsuk, US EPA, former Sr. Research Scientist with Potesta

The Advisory Committee unanimously helped develop:
(1) The core of shared environmental courses now listed as the IST Environmental Core
(2) A specialization (IST EAP) that prepares graduates for careers in the management
of environmental information and policy
(3) A specialization (ES BS) that prepares graduates for careers applying scientific
principles to environmental assessment.

Since the initial phase of program development, elements of the ES BS program have
been subject to two review processes.

• Resources, facilities, and shared curricula of ES BS and IST EAP were assessed
by two eminent environmental scientists (see Appendix McCoy and Hill Report).
• The IST General Education Core used to develop analytical and quantitative
skills of ES BS students were assessed by review team from ISAT at James
Madison University (see Appendix JMU Program review).

Faculty are assessed through frequent visits by the IST Department chair to classes
and intensive “hands on” advising of students and mentoring of faculty members. IST
faculty retreats are conducted each fall and spring to assess course content and
teaching effectiveness. Monthly faculty meetings are also conducted.

Student learning is assessed by course instructors on student work on five key learning
outcomes. These are (1) capacity to use a priori and post hoc principles to relate and
analyze environmental data, (2) use of parametric and nonparametric tests to analyze
these data, (3) capacity to develop a GIS system with surfaces and features for these
data, (4) capacity to use systems modeling to develop relationships in the River
Continuum Model, and (5) capacity to develop a coherent environmental plan. Other
factors such as analysis of quantitative data and effective communication skills are
assessed through the IST Program.

b Provide summary information on the following elements.
Chart I Assessment Summary is attached to the end of this document.

c 3 examples from past 5 years of how assessment data is used to
improve program quality.

Example 1: Development of work experience within the ES BS program:

Assessment contact: Management from two WV environmental consulting companies

Action resulting from Assessment:
Faculty of ES BS and IST developed a program in which ES BS undergraduates would
work with faculty and graduate students on a range of environmental research and
service contracts. The fact that this work had to be guaranteed for quality required
close supervision but contributed noticeably to the ES BS undergraduate’s work ethic
and work quality.

During a four year period, following the implementation of this “in house” work initiative, seventeen undergraduate students have been paid approximately $87,000 to work on:

- Mapping obstructions to fish migration in Appalachian streams for WV DOH
- Diversity and distribution of endangered aquatic organisms for WV DNR
- Building a GIS model for distribution of WV fishes for a power company
- Building a predictive model of stream flow on fish habitat for power company
- Determining the distribution of endangered and threatened species along Appalachian Roadways for Rahall Transportation Institute
- Stream model that predicts relationship between water quality and periphyton
- Using GIS to map fish populations in impaired areas of the Potomac basin
- Modeling benthic diversity in acid-impacted streams

Example 2: Service Learning
Assessment Contact: IST Faculty
Action resulting from Assessment: IST 301 expanded to include “Service Learning”

Funding ($39,000) was obtained by Drs. Michael Little and Tom Jones from the “No Child Left Behind” fund and used to train H.S. teachers to integrate experiences from local, Appalachian settings into math and science learning. Eight ES BS students completed their Service Learning commitment to IST (IST 301) by taking all fifth graders from Tucker Valley Middle School (TVMS) on a field trip to a Canaan Valley bog. Students used GPS to map specific habitats in the bog and then displayed data by GIS.

As a pilot project, five ES BS students working in collaboration with 3 MU Graduate Students are doing an assessment of an impaired, recreational lake at Blackwater Falls State Park. Data and maps from this work are also available online at gis.marshall.edu. Students received compensation from the state park in free lodging and meals for their work. This work has been approved by senior management of the West Virginia State Park and Forest system.

Example 3: Addressing inadequate problem solving abilities
Assessment Contact: Research scientists USGS and US Forest Service

Action resulting from Assessment:
Research scientists from USGS and the US Forest service taught special topics courses in “Applied Environmental Statistics” and “Environmental Modeling”. Assessment indicated that these students were not adequately using critical thinking skills to solve environmental problems. In response to this and other examples of lacking critical thinking skills, Drs. Judy Silver, Laura Adkins, and Daniel Dementiev revised the content of the IST Analytical Methods curriculum required of ES BS students and included a curricular component on systems thinking, modeling, and problem resolution.
d. **Graduate and Employer Satisfaction:**

Initially, student surveys were conducted through direct contact with graduates. As the ES program now has a significant number of graduates, the need for an automated assessment tool has been recognized. In response, a survey device has been established at [www.marshall.edu/es](http://www.marshall.edu/es) and is appended to this document. The results of this survey will be addressed in future annual reports and program reviews.

e. **Attach the previous five years of summary reports provided by the Office of Assessment.**

An assessment report from the Office of Assessment is only available for the 2003 to 2004 academic year and is attached to the end of the document.

6 **Previous Reviews:** The review indicated that a formal assessment structure had to be developed so that student response to the ES BS program could be quantified. While we have assessed curriculum and teaching in the program, now that we have a significant number of graduates, it is important to be able to quantify their success. For this purpose, an online assessment survey has been developed for graduates to easily give the program feedback. The results of the new online assessment tool will be included in future annual reports.

7 **Strengths/Weaknesses:**

**Strengths:**

1. Advising: All ES BS students are required to consult with an advisor before registering for the full tenure in the degree program. This has minimized the enrollment of ES BS students in classes not associated with their degree and has resulted in graduation near the 128 hour minimum for many students.
2. Technology: Students are exposed to the most current technology in IST 260 Instrumentation, IST 322 Terrestrial Assessment, and IST 323 Aquatic Ecology. Students are proficient in using instruments such as various GPS units for geopositioning, and computer directed assessment devices such as datasondes.
3. Computer Skills: All students develop high competency in GIS, databases, spreadsheets, statistical programs such as SPSS, and instrumentation associated software such as MATLAB.
4. Written and Verbal Communication: The capacity to develop projects and report the results from them is developed initially in the IST Communication Sequence and reinforced in required projects for IST 320, 321, 322, 323, and 423. Writing requirements are to standards for proper scientific documentation.
5. Senior Project Sequence: All students are required to plan and develop a research level project in IST 490 and then implement this plan as the project is completed in IST 491. Presentations on the plan developed in IST 490 and the project completed in IST 491 are both formally presented during the “IST Presentation Day” conducted in December and May of each year.
6. Since the transfer of ES to IST management, the number of credit hours students have to take to get their degree has dropped significantly. See graph at end: “Effectiveness of IST advising in relation to credit hours to degree completion.”

Weaknesses:
1. A single full time tenure track faculty member is assigned to the ES program.
2. The program began with no facilities, equipment or separate budget so resources had to be diverted from IST department in order to keep ES BS program running.
3. Due to the lack of resources and faculty, recruiting attempts were not made. As a remedy for the static enrollment, a program has been initiated to recruit additional students through faculty recruiting and presentations at College & Career Fairs.

B VIABILITY

1 Articulation Agreements: None.

2 Off-Campus/Distance Delivery Classes: None.

3 Service Courses: Five courses in the Environmental Science core (IST 320-323 and 423) are taken by IST EAP students. Other IST Environmental courses are possible electives for IST EAP and other IST students as well.

4 Program Course Enrollment: See Appendix V

300 level courses in the Environmental core have doubled in enrollment since 2002-2003. 200 and 400 level courses have varied in enrollment as new courses have taken the place of others. Since the reinstatement of the computer science program, enrollment in communication and analytical methods courses declined in 2004-2005. Low enrollment courses include IST 480-483 which are special topics courses, which the College of Science Curriculum Committee previously required new courses be taught as special topics courses.

5 Program Enrollment: See Appendix VI

New Students Admitted: Enrollment has leveled off since a transition period between 2000 and 2001. ES BS had a period of reduced visibility limiting new enrollees due to it not being listed in the catalog. Numbers of graduates have remained stable throughout. Since the transfer of management of ES BS to the IST Department, the number of students admitted has been relatively low but constant. The initial group of students in the program had declared the ES BS major prior to the transfer of management responsibility to IST. Subsequently, most new students were either transfer students from IST Environmental Assessment and Policy or students referred from advisors in the COS Office or from other COS Departments. The ES BS degree program was not included in the MU 2003-2005 catalog and did not have a web page, so most students enrolling in the COS were not aware that an ES BS major was available in the university.
Number of Principal Majors: There are currently 21 students declared as Environmental Science majors enrolled during the 2005 Fall semester. Enrollment numbers between the Fall of 2001 and Fall of 2005 have held steady from 20-23 students during the fall semester with a brief dip to 14 students during the Fall 2002 semester increasing to 19 students by Spring 2003.

Number of Second Majors: None currently, but an increase in number of second majors is anticipated as awareness of ES increases.

Number of Students Enrolled from other Colleges: Requirement for basic science courses makes it unlikely that students from other colleges can complete this major. However, the general nature of the IST minor makes the IST Environmental Studies courses available to these students.

Number of Minors: A minor in ES BS has been proposed and submitted to the COS Curriculum Committee. The applied content and experiential approach of these courses make them potentially useful to a wide range of students. A proposed certificate program and Area of Emphasis are described below under Consistency with Mission.

Number of Graduates: 34 from May 2001 (the first year ES BS students were under IST management) to Aug. 2005. 32 of these students completed the IST Environmental sequence. An additional 4 are expected to graduate in December of 2005.

Enrollment Projections:

According to the 2004–05 edition of the Bureau of Labor Statistics’ (BLS) Occupational Outlook Handbook, science technicians held about 208,000 jobs in 2002. Environmental science and protection technicians (including health) accounted for 28,000 of those jobs and forest and conservation technicians accounted for 19,000 of those jobs. The Bureau of Labor Statistics job outlook was as follows: “Employment of environmental science and protection technicians should grow much faster than average to help regulate waste products; to collect air, water, and soil samples for measuring levels of pollutants; to monitor compliance with environmental regulations; and to clean up contaminated sites.” The employment record in field of recent graduates of ES BS show the program is provides the job skills to obtain employment. The high proportion of ES BS graduates enrolling in and graduating from environmental graduate programs indicates students are prepared to continue their education.

While the resources available to the ES BS students were adequate to meet the basic needs of science students, this was only true if student learning was supplemented with an intensive interaction with faculty and environmental professionals. Numerous field trips were conducted for ES BS students during weekends directed by IST ES faculty and environmental professionals. These included trips to Canaan and Meadow River wetlands, impaired and pristine streams throughout Appalachian, and the Fernow Experimental Forest. The efficacy of this approach is demonstrated in the professional success of the students involved. However, considering the relatively meager resources available at that time, an intensive program for student recruitment was
impractical. However, all curricular, faculty, and facility resources are now available for an intensive student recruitment effort and that effort is currently underway.

C NECESSITY:

1 Advisory Committee: The initial advisory committee consisted of five noted professionals in the environmental field. They are Dr. Tom Shulyer, research scientist with the US Forest Service, Dr. Hugh Bevins Director of the West Virginia District US Geological Survey, Dr. Frank Borsak, USEPA Wheeling Office, Walt Kordek Director of Operations WV Department of Natural Resources. This committee met for three days in 2001, and made recommendations which are reflected by the curriculum.

A subsequent review of the ES BS program was indirectly conducted by Dr. Eli McCoy and Dr. Paul Hill in October of 2002. While the title of the study indicates that IST EAP was studied, the students interviewed were from the ES BS program and much of the curriculum and resources examined were shared among ES BS and IST EAP students. Dr. McCoy is senior managing partner of Potesta and Associates, Environmental Consultants, and Dr. Hill has extensive experience in environmental studies and is currently Director for the West Virginia EPSCOR program. Their report is appended.

An additional review was conducted on site in November 2002 by a team of faculty and administrators from the Integrated Science and Technology Program at James Madison University. Their report is appended to this document. Their primary concern was that the learning and communication skills of ES and IST students be maintained through an expansion of the integrated portion of the program. This has been addressed by the increase in writing and analytical activities in the IST 320, 321, 322, and 323 sequence.

We plan to reconvene an Advisory Committee in the Fall of 2006 to reassess the program in light of the 5 year program review feedback.

2 Graduates: Of the 34 graduates in ES BS from 2001 to 2005, three have been employed at the Army Corp of Engineers, four at WV DEP, eight at private, consulting companies, two are in graduate, education programs, eight have earned MS degrees in environmental programs, seven are presently enrolled in graduate programs. This accounts for 28 of the graduates of the program that have been in contact with us. These numbers are summarized in Table III. Several graduates have had employment from more than one government agency and several are presently enrolled in graduate programs as part of compliance with their job descriptions.

Graduates have been employed by ORSANCO, US Fish and Wildlife, energy and communication companies, US Forest Service, and US EPA. The student employed by US EPA is presently in an accelerated program design to develop upper management personnel; the three students employed at the Corps of Engineers have all earned MS degrees and are well established in management positions.

3 Job Placement: While a relatively high number of graduates of ES
BS have been employed in field and have continued education in graduate programs, we see significant room for improvement. It has been particularly satisfying that a number of students who have succeeded post ES BS graduation did not achieve academic excellence while at Marshall. However, they have taken advantage of the general education at Marshall and specifically the job-related skills in ES BS to mature into effective environmental studies employees.

As the graduates from 2001 to 2005 are a relatively small group of students we have been able to follow their careers (and consequently assess their response to the ES BS program) by direct contact. However, we intend to double enrollment in the next three years and this will require a more structured tracking mechanism. To start this process, a website has been developed for the program at www.marshall.edu/es which includes a survey page for graduates. We have started an intensive recruitment effort to double enrollment over the next three years. This program includes:

- Purchase of a large, three panel display for IST and ES BS. ES BS is prominently featured on 1/3rd of this display.
- Development of a new IST/ES BS brochure. (Appended to this document). Distribution "by hand" to all local guidance counselors and by mail to all "undecided" students requesting information on Marshall COS.
- Visits to “Career Fairs” in Putnam and Greenbrier County this month and others.

D CONSISTENCY WITH UNIVERSITY MISSION:

The ES BS Program, as well as the associated IST Program, has a commitment to recruit and retain a diverse student population. In addition, these programs conscientiously work towards compliance with Marshall University’s Mission Statement.

- The Environmental Science B.S. Degree program educates students to be successful. Once students enter the program, they graduate at a high rate.
- ES BS Students are successfully becoming employed in their field both in this region and nationwide. This is consistent with the 1997 program assessment which stated a primary goal of the ES BS program was to “help meet regional needs for environmental professionals to assist employers with their environmental concerns.”
- ES BS students are successfully admitted to graduate and post-graduate schools.
- Service activities are part of the learning process, with all ES BS students required to complete IST 301: Public Service which requires 30 hours of volunteer service.
- Both ES BS students and faculty assist watershed coalitions, conduct assessments and increase health of the environment through cleanups and recycling activities.
- ES BS students are trained in the latest technology through link with IST.
- ES BS students get practical work experience working on grants with ES faculty.
- ES students complete a capstone research project aiding development as scientists.
- ES faculty use active learning and other innovative teaching methods at a high rate.
- Critical thinking skills are an integral part of the ES curriculum through IST courses.
- ES faculty actively mentor ES BS students in courses and during research projects.
- ES curriculum is regularly reviewed both internally and externally and frequently updated to keep abreast of recent developments in technology and science.
Continuation of ES program:

- First, West Virginia has a long history of need for the types of actions associated with environmental science environmental assessment, social and legal action, and environmental remediation. As land use in Appalachia expands in the future, the need for competent environmental scientists will increase.
- Second, there is predicted nationally a high demand for graduates from programs which emphasize integration of science and technology into environmental studies.
- Third, a large number of baccalaureate institutions recognize the need for a well educated work force in environmental studies. Brown University’s Environmental studies website at http://envstudies.brown.edu/env/info/programs.php lists 211 baccalaureate institutions with a BS degree in some form of environmental study.
- Fourth, the ES BS Program has prepared graduates for both immediate employment in the environmental field and for further education in graduate programs.
- Fifth, the ES BS Program now has facilities, staff, and materials adequate to support a significant expansion of enrollment in the future.

A collaborative undergraduate certificate program is under development in GIS with CITE, Geography, Physical Science and IST. This will have IST 322, 323 and 423 as electives as part of the University-wide GIS initiative.

In collaboration with the Rahall Transportation Institute, an Area of Emphasis in Transportation Technology is under development which adds to the core requirements for the ES BS degree additional knowledge and skills from two special topics IST courses, “Biomonitoring” and “CAD and Terra Modeling” along with courses in “Geomatics” (from CITE); “Principles of Domestic Transportation” (from COB) and GIS courses on vector and raster analysis (from COLA).
Appendices:
## Appendix I

### Required/Elective Course Work in the Program

**Degree Program:** Environmental Science  
**Person responsible for the report:** Dr. Michael Little

<table>
<thead>
<tr>
<th>Courses Required in Major (By Course Number and Title)</th>
<th>Total Required Hours</th>
<th>Elective Credit Required by the Major (By Course Number and Title)</th>
<th>Elective Hours</th>
<th>Related Fields Courses Required</th>
<th>Total Related Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communications Sequence (12 hours)</strong></td>
<td></td>
<td>Elective hours (recommend students take minor in consultation with advisor)</td>
<td>12-15</td>
<td><strong>General education block (18 hours)</strong></td>
<td></td>
</tr>
<tr>
<td>IST 101: Fund. Of Comm.</td>
<td>4</td>
<td></td>
<td></td>
<td>Social Sciences</td>
<td>9</td>
</tr>
<tr>
<td>IST 120: Connections I</td>
<td>2</td>
<td></td>
<td></td>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>IST 201: Advanced Comm.</td>
<td>4</td>
<td></td>
<td></td>
<td>Humanities</td>
<td>3</td>
</tr>
<tr>
<td>IST 220: Connections II</td>
<td>2</td>
<td></td>
<td></td>
<td>Art/Music/Theater Apprec.</td>
<td>3</td>
</tr>
<tr>
<td><strong>Analytical Methods Sequence (12 hours)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 130: Analytical Methods I</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 131: Differential Calculus</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 230: Integral Calculus/Series</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 231: Linear Algebra/Diff. Eq.</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Basic Science Sequence (23 hours)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSC 120: Princ Of Biology</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 211: Princ. Of Chem. I</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 212: Princ. Of Chem. II</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 217: Princ. Of Chem Lab I</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 218: Princ. Of Chem Lab II</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 212: Energy</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLY 200: Physical Geology</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 160: Intro to Programming OR</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 260: Instrumentation</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courses Required in Major (By Course Number and Title)</td>
<td>Total Required Hours</td>
<td>Elective Credit Required by the Major (By Course Number and Title)</td>
<td>Elective Hours</td>
<td>Related Fields Courses Required</td>
<td>Total Related Hours</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>----------------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><em>Environmental Core Sequence (27 hours)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 320: Nature of Env. Problems</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 321: Resolution of Env. Prob.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 322: Assess. I: Terr. Systems</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 323: Assess. II: Aq. Systems</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 423: GIS and Integrated Data Systems</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 424: Env. Risk Assess.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 490: Senior Project I</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 491: Senior Project II</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IST 301: Public Service</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional 3-400 level course work in Chemistry, Biology, Geology, or Physics</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Courses submitted for approval, currently taught as Special Topics courses as IST 480-483
Appendix II:

FACULTY DATA SHEETS
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Michael Little
____________________________Rank: Professor

Status (Check one): Full-time x Part-time_ _____ Adjunct _____ Current MU Faculty: _x_ yes ___no

Highest Degree Earned: Ph. D. __ Date Degree Received: May 1983

Conferred by: University of Louisville

Area of Specialization: Biology

Professional Registration/Licensure ___________ Agency:____________________________________

Years non-teaching experience 2
Years of employment other than Marshall 7
Years of employment at Marshall 31
Years of employment in higher education 31
Years in service at Marshall during this period of review 5

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>IST 301</td>
<td>Public Service Experience</td>
<td>17</td>
</tr>
<tr>
<td>2005/Spring</td>
<td>IST 323</td>
<td>Assessment II: Aquatic Ecology</td>
<td>11</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 301</td>
<td>Public Service Experience</td>
<td>13</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 322</td>
<td>Assessment I: Terrestrial Systems</td>
<td>9</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 483</td>
<td>SpTp: GIS &amp; Integrated Systems</td>
<td>15</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 301</td>
<td>Public Service Experience</td>
<td>22</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 323</td>
<td>Assessment II: Aquatic Ecology</td>
<td>9</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 301</td>
<td>Public Service Experience</td>
<td>17</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 322</td>
<td>Assessment I: Terrestrial Systems</td>
<td>12</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 483</td>
<td>SpTp: Spatial Analysis for the Environment</td>
<td>16</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1 If your degree is not in your area of current assignment, please explain.
   Biology background has been enhanced with experience working for USGS, US FWS, WV DNR, and other agencies

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2 Activities that have enhanced your teaching and or research.
   Attendance at critical thinking workshops
   Discipline-related books/papers published (provide a full citation).

3 Papers presented at state, regional, national, or international conferences.

Two presentations at the Ohio River Biological Consortium Annual Meetings, 2005

4 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

5 Externally funded research grants and contracts you received.
   $145000 Dominion Power, Stream Modeling of an Impacted river system
   $50000 US DOH Modeling Fish Crossings in Southern WV
   $290000 No Child Left Behind Education Grant

6 Awards/honors (including invitations to speak in your area of expertise) or special recognition.
   2003 Drinko Fellow

7 Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Thomas Jones  Rank: Adjunct Faculty

Status (Check one): Full-time____ Part-time_____ Adjunct X__  Current MU Faculty: ___yes   X__no

Highest Degree Earned: ____Ph.D.____ Date Degree Received: __December 1997__________
Conferred by: University of Louisville

Area of Specialization: Environmental Science

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>BSC 431</td>
<td>Limnology</td>
<td>15</td>
</tr>
<tr>
<td>2005/Spring</td>
<td>BSC 463/IST 483</td>
<td>Tropical Ecology</td>
<td>6</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 481</td>
<td>Biomonitoring</td>
<td>1</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>HON 396</td>
<td>Endangered Species</td>
<td>7</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 490</td>
<td>Fish Biology</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.
1 If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2 Activities that have enhanced your teaching and or research.
   Master of 100 ton vessel on inland waterways certification class, May 2004  
   PADI SCUBA Open Water Instructor Certification, June 2004

3 Discipline-related books/papers published (provide a full citation).

4 Papers presented at state, regional, national, or international conferences.

5 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   Association of Mid-Atlantic Aquatic Biologist Workshop, March 2004.  Cacapon State Park, Berkeley Springs, WV  
   Tom Jones, Roger Thoma, and Casey Swecker held crayfish workshop for agency/consultants from WV, MD, VA, DE, and PA 2003
   National Science Teachers Association
   Professional Association of Diving Instructors (PADI), Diver Master
   American Fisheries Society
   North America Benthological Society
   Association of Southeastern Biologist
   National Speleological Society, Biology Section

6 Externally funded research grants and contracts you received.
   Benthic Insect Identification. Tom Jones and John Enz. Acculah Corp. $15,000.
   The use of GIS and database information to identify sampling locations for a rare crayfish. WV DNR & Rahall Transportation

Date Created: March 6, 2002 Revised: 12/20/2005
Initial Appendices
Office of Program Review and Assessment, Academic Affairs, Marshall University, Huntington, WV 25755
Institute (RTI).  2002.  $6,000.
Biomonitoring and fish utilization of in-stream transportation structures on the Kanawha and Ohio Rivers. Tom Jones and Eric Emory. ORSANCO & RTI. 2002. $50,000.
GIS mapping and database linking for OSANCOs’ benthic insect data. Tom Jones. ORSANCO and RTI. 2002. $44,000
Seasonality of the WVSCL scores. Tom Jones. 2002 WV DEP. $19,000.
Pre-construction Assessment of Wetlands to be built along the Tolsia Highway. Tom Jones, Michael Robinson, Dan Evans, Frank Gilliam, Chuck Sommerville, and Dewey Sanderson. WVDOT/RTI. 2001. $104,000.

7 Awards/honors (including invitations to speak in your area of expertise) or special recognition.
American Institute of Biological Sciences, Washington DC
Characterization of Native and Invasive Crayfish Habitat and Genetics in West Virginia. Jooha Jeong, Katherine Channel, Beau Gerlach, Andrew Rieser, Casey Swecker, Amy Wolf, Tom Jones, Barry Landers and Elizabeth Murray. Poster presented 3/12/2004 (national)

8 Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Ralph W. Taylor  Rank: Professor

Status (Check one):  Full-time  Part-time  X  Adjunct  Current MU Faculty:  X yes  no

Highest Degree Earned:  Ph.D. Date Degree Received: 1972

Conferred by: University of Louisville

Area of Specialization: Biology-Herpetology

Professional Registration/Licensure:  
Agency:  

<table>
<thead>
<tr>
<th>Years non-teaching experience</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of employment other than Marshall</td>
<td>6</td>
</tr>
<tr>
<td>Years of employment at Marshall</td>
<td>33</td>
</tr>
<tr>
<td>Years of employment in higher education</td>
<td>33</td>
</tr>
<tr>
<td>Years in service at Marshall during this period of review</td>
<td>5</td>
</tr>
</tbody>
</table>

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>PS 583</td>
<td>SpTp: Issues Modern Malacology</td>
<td>5</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>UNI 101</td>
<td>New Student Seminar</td>
<td>12</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>PS 583</td>
<td>SpTp: Issues Modern Malacology</td>
<td>5</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 301</td>
<td>Public Service Experience</td>
<td>11</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1  If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2.  Activities that have enhanced your teaching and or research.

3  Discipline-related books/papers published (provide a full citation).

4  Papers presented at state, regional, national, or international conferences.
Presented paper at the 2005 Bi-annual meeting of the Freshwater Mollusk Conservation Society in St. Paul, MN. “Some Preliminary Comments of the Aquatic Snails of West Virginia”

5  Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
Commissioner-Cabell County Solid Waster Authority- Appointed by the Governor on recommendation by the Director fo the Department of Natural Resources.
One of three elected directors of the West Virginia Association of Solid Waste Authorities Trustee and Founding member of the Ohio River Basin Consortium for Research and Education

6  Externally funded research grants and contracts you received.
Grant 2004 – National Park Service “The Freshwater Mussels of New River Gorge, WV”, $39,500.00
Grant 2004– WV Natural Heritage Program “The Land Snails of New River Gorge”, $2,500.00
Grant 2004- WVDNR, “Digitally Capture data from the land snail collection”, $4,450.00
Grant 2005- WVDNR/USFWS, “A survey of the Land Snails on Islands in the Ohio River”, $5,000.00

7  Awards/honors (including invitations to speak in your area of expertise) or special recognition.
2002 Award for Outstanding Service to the University
2002 Received recognition at Governor’s Service award Ceremony for 30 years service to West Virginia

8  Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Samuel Colvin
Rank: Full-time Temp Instructor

Status (Check one): Full-time_____ Part-time_____ Adjunct___
Current MU Faculty: ___yes ___no

Highest Degree Earned: Masters (MPA) Date Degree Received: Dec. 1972
Conferred by: West Virginia University

Area of Specialization: Public Administration

Years non-teaching experience 16
Years of employment other than Marshall 16
Years of employment at Marshall 2
Years of employment in higher education 2
Years in service at Marshall during this period of review 2

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2005</td>
<td>IST 321</td>
<td>Resolving Environmental Problems</td>
<td>7</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 111</td>
<td>Living Systems</td>
<td>19</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 320</td>
<td>Nature of Environmental Problems</td>
<td>10</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 321</td>
<td>Resolving Environmental Problems</td>
<td>12</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 111</td>
<td>Living Systems</td>
<td>53</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 320</td>
<td>Nature of Environmental Problems</td>
<td>9</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1 If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2 Activities that have enhanced your teaching and or research.

3 Discipline-related books/papers published (provide a full citation).

4 Papers presented at state, regional, national, or international conferences.

5 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

6 Externally funded research grants and contracts you received.

7 Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8 Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Jagannath Valluri
Rank: Professor

Status (Check one): Full-time X Part-time ___ Adjunct ___ Current MU Faculty: X yes ___ no

Highest Degree Earned: Ph.D. Date Degree Received: 1988
Conferred by: Texas A&M University

Area of Specialization: Molecular Biology

Professional Registration/Licensure Agency:

Years non-teaching experience
Years of employment other than Marshall
Years of employment at Marshall
Years of employment in higher education
Years in service at Marshall during this period of review

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>IST 424</td>
<td>Environmental Risk Assessment</td>
<td>6</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 424</td>
<td>Environmental Risk Assessment</td>
<td>8</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1 If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2 Activities that have enhanced your teaching and or research.

3 Discipline-related books/papers published (provide a full citation).

4 Papers presented at state, regional, national, or international conferences.

5 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

6 Externally funded research grants and contracts you received.

7 Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8 Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Andrew Gooding
Rank: Assistant Professor

Status (Check one): Full-time X Part-time _______ Adjunct _______ Current MU Faculty: X yes no

Highest Degree Earned: MA __________________Date Degree Received: May 1991
Conferred by: University of North Carolina/Chapel Hill
Area of Specialization: Speech Communications

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring IST 201 (2 sections)</td>
<td>Advanced Communications-team taught</td>
<td>50/50% with C. True</td>
<td>25</td>
</tr>
<tr>
<td>2005/Spring IST 220</td>
<td>Connections II – team taught</td>
<td>50/50% with True</td>
<td>27</td>
</tr>
<tr>
<td>2004/Fall IST 101 (2 sections)</td>
<td>Fundamentals of Communication- team taught</td>
<td>50/50% w/ True</td>
<td>19</td>
</tr>
<tr>
<td>2004/Fall IST 120 (2 sections)</td>
<td>Connections I – team taught</td>
<td>50/50% w/ True &amp; 60/40 w/Murray</td>
<td>18</td>
</tr>
<tr>
<td>2004/Spring IST 201 (2 sections)</td>
<td>Advanced Communications –team taught</td>
<td>50/50% w/ C. True</td>
<td>22</td>
</tr>
<tr>
<td>2003/Fall IST 101 (2 sections)</td>
<td>Fundamentals of Communication</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>2003/Fall IST 120 (2 sections)</td>
<td>Connections I- team taught</td>
<td>40/60 with True (1 section) &amp; 66/34 w/ Dr. Taylor (1 section)</td>
<td>33</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1. If your degree is not in your area of current assignment, please explain.
   My degree is in Speech Communication. During my PhD work at the University of Illinois-Urbana I taught a combined Public Speaking-Freshman Composition two semester hybrid course for my first four years. This course combined the course content from an English 101 and English 102 course with the Communications 103 course.
   Additionally I taught for 1 year in the English Department at the University of Illinois-Urbana. I taught the equivalent of an English 102 course with a mandatory 45 minute individual consultation for each student each week.
   Finally I have been trained as a Writing Across the Curriculum Instructor, both at the University of Illinois-Urbana and at Marshall. I am one of the few faculty in the College of Science certified to teach Writing-Intensive courses.

2. (For each of the following sections, list only events during the period of this review and begin with the most recent activities.
   Activities that have enhanced your teaching and or research.
   Spring 2003: Recertified as Writing Across the Curriculum (WAC) instructor.
   Fall 2002: Attended workshop on Risk Communication at NCA convention in New Orleans, LA.
   Summer 2002: Won $5000 grant funded by Center of Teaching Excellence for IST faculty to visit James Madison University to observe IST program there. Discussed program and goals of programs.
   Spring 2001: Became Writing-Intensive certified by Writing Across the Curriculum (WAC) Committee.
   Fall 2000: Attended Teaching and Learning Conference in Ashland, KY.

3. Discipline-related books/papers published (provide a full citation).
4 Papers presented at state, regional, national, or international conferences.
2003: "The Huntington Memorial Arch: 100% Americanism or Mourning of the Dead?" NCA Conv., Miami Beach, FL.
2000: "In Splendid Forgetfulness: The Tomb of the Unknown Soldier." RSA Conf., Washington, DC.
2000: "In Splendid Forgetfulness: The Tomb of the Unknown Soldier." MAASA Conf., Johnstown PA.

5 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Member of: National Communication Association (NCA)
National College Science Teachers Association (NCST)
Rhetoric Society of America (RSA)
Mid-Atlantic American Studies (MAASA)

2005: National Communication Association (NCA) Convention, Boston, MA
2005: Contesting Public Memories Conference, Syracuse, NY
2004: National Communication Association (NCA) Convention, Chicago, IL
2003: National Communication Association (NCA) Convention, Miami Beach, FL
2002: National Communication Association (NCA) Convention, New Orleans, LA
2001: National Communication Association (NCA) Convention, Atlanta, GA
2000: National Communication Association (NCA) Convention, Seattle, WA
2000: Rhetoric Society of America (RSA) Conference, Washington DC
2000: Mid-Atlantic American Studies Conference, (MAASA) Johnstown PA

6 Externally funded research grants and contracts you received.
None.

7 Awards/honors (including invitations to speak in your area of expertise) or special recognition.

Spring 2002: Two-time guest lecturer at Bill Denman’s graduate level Rhetoric and WWII course.
Fall 2001: Spring 2002: Guest lecturer at Tom Jones’ ISC courses to discuss debate preparation.
Fall 2000: Guest lecturer at David Woodward’s honor’s course on the Vietnam War.

8 Community service as defined in the Greenbook.

2003-04 Served on Advisory Board for Marshall University Early Education Center, advised on policies, website and fundraising for center.

Coached youth soccer in U-6 division fall 2004, assistant coach for U-5 division, spring 2003
Assist with field trips at Marshall Early Education Center.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Caroline Gold True
______________________________
______________________________
Rank: Temp. Full-Time Faculty
______________________________
Status (Check one): Full-time Part-time Adjunct X Current MU Faculty: yes no
______________________________
______________________________
Highest Degree Earned: Masters of Arts
______________________________
______________________________
Date DegreeReceived: May 2000
______________________________
______________________________
Conferred by: Marshall University
______________________________
______________________________
Area of Specialization: Communications Studies
______________________________
______________________________
Professional Registration/Licensure Agency:
______________________________
______________________________
Years non-teaching experience
1
______________________________
______________________________
Years of employment other than Marshall
1
______________________________
______________________________
Years of employment at Marshall
4
______________________________
______________________________
Years of employment in higher education
4
______________________________
______________________________
Years in service at Marshall during this period of review
4
______________________________
______________________________
List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>IST 201 (2 sections)</td>
<td>Advanced Communications-team taught 50/50% w/ A. Gooding</td>
<td>25</td>
</tr>
<tr>
<td>2005/Spring</td>
<td>IST 220</td>
<td>Connections II –team taught 50/50% w/ A. Gooding</td>
<td>27</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 101 (2 sections)</td>
<td>Fundamentals of Communication-team taught 50/50% w/Gooding</td>
<td>19</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 120 (1 section)</td>
<td>Connections I- team taught 50/50% with A. Gooding</td>
<td>10</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 201 (2 sections)</td>
<td>Advanced Communications – team taught 50/50% with C. True</td>
<td>22</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 220 (2 sections)</td>
<td>Connections II-team taught w/ Murray 60/40 &amp; Taylor 60/40</td>
<td>25</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 101</td>
<td>Fundamentals of Communication</td>
<td>13</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 120 (2 sections)</td>
<td>Connections I-team taught w/Goody 60/40 &amp; Murray 40/60</td>
<td>35</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1 If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2 Activities that have enhanced your teaching and or research.

3 Discipline-related books/papers published (provide a full citation).

4 Papers presented at state, regional, national, or international conferences.

5 Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

6 Externally funded research grants and contracts you received.

7 Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8 Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Nosratollah Chahryar-Namini

Rank: Associate Professor

Status (Check one): Full-time__X___ Part-time______ Adjunct______ Current MU Faculty: _X__yes ___no

Highest Degree Earned: __Ph.D.____________________Date Degree Received: __1980___________

Conferred by: Jussieu University of Paris (Paris VI)

Area of Specialization: Computer Science

Professional Registration/Licensure __________________ Agency:______________________________

Years non-teaching experience ________

Years of employment other than Marshall _____

Years of employment at Marshall _______

Years of employment in higher education _______

Years in service at Marshall during this period of review __________

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/Spring</td>
<td>IST 160 (3 sections)</td>
<td>Intro to Programming</td>
<td>39</td>
</tr>
<tr>
<td>2004/Fall</td>
<td>IST 160 (2 sections)</td>
<td>Intro to Programming</td>
<td>12</td>
</tr>
<tr>
<td>2004/Spring</td>
<td>IST 160 (2 sections)</td>
<td>Intro to Programming</td>
<td>23</td>
</tr>
<tr>
<td>2003/Fall</td>
<td>IST 160 (3 sections)</td>
<td>Intro to Programming</td>
<td>39</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty does not need to fill in the remainder of this document.

1 If your degree is not in your area of current assignment, please explain.

(For each of the following sections, list only events during the period of this review and begin with the most recent activities.

2. Activities that have enhanced your teaching or research.
   None

3. Discipline-related books/papers published (provide a full citation).
   None

4. Papers presented at state, regional, national, or international conferences.
   None

5. Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   Association for Computing Machinery (ACM)

6. Externally funded research grants and contracts you received.
   None

7. Awards/honors (including invitations to speak in your area of expertise) or special recognition.
   None

8. Community service as defined in the Greenbook
   None

Date Created: March 6, 2002   Revised: 12/20/2005

Initial Appendices
Office of Program Review and Assessment, Academic Affairs, Marshall University, Huntington, WV 25755
## Appendix V
### Program Course Enrollment

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Required/Elective</th>
<th>Year 1 2000-2001</th>
<th>Year 2 2001-2002</th>
<th>Year 3 2002-2003</th>
<th>Year 4 2003-2004</th>
<th>Year 5 2004-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Su</td>
<td>Fa</td>
<td>Sp</td>
<td>Su</td>
<td>Fa</td>
</tr>
<tr>
<td>IST 101</td>
<td>Fund. Of Comm.</td>
<td>Req.*</td>
<td>42</td>
<td>0</td>
<td>46</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>IST 120</td>
<td>Connections I</td>
<td>Req.*</td>
<td>45</td>
<td>0</td>
<td>51</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>IST 201</td>
<td>Advanced Comm.</td>
<td>Req.*</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>IST 220</td>
<td>Connections II</td>
<td>Req.*</td>
<td>0</td>
<td>28</td>
<td>0</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>IST 130</td>
<td>Analytical Methods I</td>
<td>Req.*</td>
<td>43</td>
<td>0</td>
<td>37</td>
<td>0</td>
<td>47</td>
</tr>
<tr>
<td>IST 131</td>
<td>Diff. Calculus</td>
<td>Req.*</td>
<td>0</td>
<td>45</td>
<td>0</td>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td>IST 230</td>
<td>Integral Calc./Series</td>
<td>Req.*</td>
<td>27</td>
<td>0</td>
<td>37</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>IST 231</td>
<td>Linear Alg./Diff. Eq.</td>
<td>Req.*</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>IST 212</td>
<td>Energy</td>
<td>Option or PHY 201*</td>
<td>0</td>
<td>25</td>
<td>0</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>IST 160</td>
<td>Intro to Programming</td>
<td>Req. or take 260*</td>
<td>0</td>
<td>52</td>
<td>44</td>
<td>21</td>
<td>53</td>
</tr>
<tr>
<td>IST 260</td>
<td>Instrumentation</td>
<td>Req. or take 160*</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IST 301</td>
<td>Public Service</td>
<td>Req.*</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>15</td>
<td>19</td>
</tr>
</tbody>
</table>

Date Created: March 6, 2002    Revised: 12/20/2005
Initial Appendices
Office of Program Review and Assessment, Academic Affairs, Marshall University, Huntington, WV 25755
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Required/Elective</th>
<th>Year 1 2000-2001</th>
<th>Year 2 2001-2002</th>
<th>Year 3 2002-2003</th>
<th>Year 4 2003-2004</th>
<th>Year 5 2004-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Su</td>
<td>Fa</td>
<td>Sp</td>
<td>Su</td>
<td>Fa</td>
<td>Sp</td>
</tr>
<tr>
<td>IST 320</td>
<td>Nature of Env. Problems</td>
<td>Req.</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>IST 321</td>
<td>Resol. of Env. Problems</td>
<td>Req.</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>IST 322</td>
<td>Assess. I: Terr. Sys.</td>
<td>Req.</td>
<td>9</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>IST 323</td>
<td>Assess. II: Aq. Sys.</td>
<td>Req.</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>IST 420</td>
<td>Remote Sensing</td>
<td>Elect.</td>
<td>13</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>IST 421</td>
<td>Digital Image Proc.</td>
<td>Elect.</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>IST 423</td>
<td>Appl. Env. Stat. &amp; Data Mgt</td>
<td>Previously Req. †</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>IST 423</td>
<td>GIS and Integ. Data Systems</td>
<td>Req. †</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>IST 424</td>
<td>Env. Risk Assess.</td>
<td>Req.</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>IST 481</td>
<td>Biomonitoring</td>
<td>Elect. ‡</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>IST 481</td>
<td>Aquatic Diversity</td>
<td>Elect. ‡</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IST 481</td>
<td>Env. Modeling</td>
<td>Elect. ‡</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IST 483</td>
<td>Tropical Ecology</td>
<td>Elect. ‡</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IST 485-8</td>
<td>Independent Study</td>
<td>Elect. **</td>
<td>16</td>
<td>12</td>
<td>4</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>IST 470</td>
<td>Internship</td>
<td>Elect. **</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>IST 490</td>
<td>Senior Project I</td>
<td>Req. **</td>
<td>9</td>
<td>3</td>
<td>19</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>IST 491</td>
<td>Senior Project II</td>
<td>Req. **</td>
<td>0</td>
<td>15</td>
<td>1</td>
<td>6</td>
<td>19</td>
</tr>
</tbody>
</table>

* IST courses include enrollment for IST areas of emphasis, so do not just represent ES students
**Independent Study/Internships/Senior Project I and II were not listed separately by instructor until Fall 2002, so enrollments include students in other areas of IST
† IST 423 is now GIS and Integrated Data Systems. It was previously taught as special topics IST 482-483. IST 423 was prior to Fall 2005 a required Env. Stat’s course.
‡ Courses taught as Special Topics as part of previous College of Science Curriculum Committee requirement that new courses first be taught as special topic courses.

Date Created: March 6, 2002 Revised: 12/20/2005
Initial Appendices
Office of Program Review and Assessment, Academic Affairs, Marshall University, Huntington, WV 25755
## Appendix VI
### Program Enrollment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New Students Admitted</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Principal Majors Enrolled</td>
<td>32</td>
<td>22</td>
<td>19</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>Area of Emphasis:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of Emphasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of Emphasis, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Majors Enrolled*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Areas of Emphasis (i.e., education specialization majors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minors**</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Grand Total of Students Enrolled in the Program</strong></td>
<td>32</td>
<td>22</td>
<td>19</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td><strong>Graduates of the program</strong></td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

*If known. This information is not completely accurate at this time, as students often do not declare a second major until the junior evaluation or the student has her/his primary major in another college.

**If known. This information is not completely accurate at this time, as students often do not declare minors until the junior evaluation or senior application for graduation.
TABLES:
### TABLE I: Admission Standards ACT/SAT Score Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th># Students Meeting</th>
<th># Not Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1996</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Spring 1997</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fall 1997</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Spring 1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 1998</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Spring 1999</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Fall 1999</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Spring 2000</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fall 2000</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Spring 2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2001</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Spring 2002</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fall 2002</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Spring 2003</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fall 2003</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Spring 2004</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>
### TABLE II: Chronological Breakdown of Graduate by GPA, ACT, and Credit Hours

<table>
<thead>
<tr>
<th>Date</th>
<th>Number</th>
<th>Avg. GPA</th>
<th>Avg. ACT MTH</th>
<th>Avg. ACT Composite</th>
<th>Avg. Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-May-99</td>
<td>1</td>
<td>3.73</td>
<td>19</td>
<td>23</td>
<td>176</td>
</tr>
<tr>
<td>13-Aug-99</td>
<td>1</td>
<td>3.3</td>
<td>29</td>
<td>27</td>
<td>140</td>
</tr>
<tr>
<td>6-May-00</td>
<td>4</td>
<td>2.78</td>
<td>17.83</td>
<td>20</td>
<td>167.25</td>
</tr>
<tr>
<td>12-Dec-00</td>
<td>1</td>
<td>2.88</td>
<td>23</td>
<td>23</td>
<td>156</td>
</tr>
<tr>
<td>5-May-01</td>
<td>7</td>
<td>2.69</td>
<td>20.73</td>
<td>23.8</td>
<td>150.09</td>
</tr>
<tr>
<td>14-Dec-01</td>
<td>1</td>
<td>4</td>
<td>27</td>
<td>24</td>
<td>167</td>
</tr>
<tr>
<td>11-May-02</td>
<td>5</td>
<td>2.93</td>
<td>17</td>
<td>20</td>
<td>152</td>
</tr>
<tr>
<td>12-Jul-02</td>
<td>1</td>
<td>3.07</td>
<td>21</td>
<td>27</td>
<td>128</td>
</tr>
<tr>
<td>10-May-03</td>
<td>6</td>
<td>2.65</td>
<td>19.29</td>
<td>21.1</td>
<td>151</td>
</tr>
<tr>
<td>12-Dec-03</td>
<td>2</td>
<td>2.69</td>
<td>20.75</td>
<td>22.3</td>
<td>154</td>
</tr>
<tr>
<td>8-May-04</td>
<td>6</td>
<td>2.69</td>
<td>19</td>
<td>18.8</td>
<td>146.33</td>
</tr>
<tr>
<td>13-Aug-04</td>
<td>1</td>
<td>2.52</td>
<td>16</td>
<td>16</td>
<td>214</td>
</tr>
<tr>
<td>10-Dec-04</td>
<td>3</td>
<td>3.02</td>
<td>18.29</td>
<td>19.3</td>
<td>142</td>
</tr>
<tr>
<td>7-May-05</td>
<td>2</td>
<td>3.2</td>
<td>22</td>
<td>22</td>
<td>135.5</td>
</tr>
<tr>
<td></td>
<td>Post Graduation History</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Number of ES BS graduates May 01-May 05</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Number of ES BS graduates who completed the IST environmental studies sequence</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Number of ES BS students in IST, (#2) for whom post graduation information is available</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Number who have enrolled in graduate program</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Number enrolled in environmental studies graduate programs</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Number who have completed a graduate degree program in environmental studies</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Number presently employed in environmental field, federal employment (US Corps Engineers)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Number presently employed in environmental field, state employment (WV DEP)</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Number presently employed by private environmental assessment and/or engineering companies</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Effectiveness of IST Advising in relation to credit hours to degree completion

Even though a large number of students transfer into the ES BS program and consequently lose credit hours, the improved advising system that has been established has resulted in their graduation with fewer credit hours amassed beyond the minimum.
INTTEGRATED SCIENCE AND TECHNOLOGY PROGRAM

Program Description. Environmental Assessment and Policy Program. This concentration integrates IST math and computer expertise with knowledge of environmental law, regulation, and policy and provides students with the most current skills used to assess environmental quality and develop environmental policies. The program emphasizes a “hands on” approach as students learn current practices in environmental practice by such activities as assessing the impact of deer populations on forest regeneration, quantifying bacterial contamination of local waters, and using satellite imagery to measure a wetland impacted by road construction. Graduates will be prepared for work in such fields as risk assessment, modeling and GIS systems, and environmental documentation. Further, this concentration prepares students for careers in environmental compliance work, evaluating environmental impacts, and developing environmentally responsible polices and plans. Four course options are offered.

Introduction

In September 2002 Dr. Ralph Taylor contacted Drs. Eli McCoy and Paul Hill to ask that they conduct an evaluation of the IST program which would be included in his five year program review. The request to McCoy and Hill was limited to the Environmental Assessment component of the IST program as described above. As a part of this review, McCoy and Hill visited the campus on October 8, 2002. The site visit included in-depth discussions with Dr. Taylor and faculty members as well as review of materials and a facilities tour of the campus.

Initial Information Gathering

Dr. Taylor, as per the dean’s suggestion, provided a brief overview of the entire IST program and concluded with a detailed discussion of the EA&P program. Following this, Drs. Mike Little and Tom Jones joined the group for a tour of the facilities. The tour included existing facilities and those currently under construction. Dr. Joe Bragin, Dean of the College of Science joined the group for lunch where further aspects of the program were discussed. Following lunch, reviewers met with two of the communications (English) instructors. They provided, in great detail, the principals employed in their teaching efforts and the techniques employed to evaluate student performance. Dr. Taylor discussed the financial support that currently supported the program. During this discussion, he explained how Jones and Little had obtained funding from other sources to support their efforts. Following this, McCoy and Hill had the opportunity to meet with three students in the program. (Students were those present in the Morrow laboratory facility during the visit, and were selected at random). Dr. Taylor removed himself from the room during these interviews. The review session ended at the conclusion of the interviews.

It is interesting to note that many on-campus peers have derided the IST program calling it a
trade-school or “bunny” curriculum. This perception-based conflict between traditional and applied programs is better assessed through review of coursework and student metrics. Traditional science degrees in biology and chemistry were generally compared to that of the IST while test scores and post-degree advancement were also discussed by the reviewers.

Dr. Taylor later forwarded to Drs. McCoy and Hill copies of specific program requirements, course descriptions or syllabi, and other information that was reviewed for this report. The seven-page “Integrated Science and Technology Program – Environmental Assessment and Policy” document is included as an attachment.

It should be noted that McCoy and Hill both knew Taylor and Little previously, as undergraduate or graduate students when they completed biology degrees at Marshall University. McCoy has had a professional relationship with Jones. Jones provided contract macroinvertebrate identification services to the McCoy’s current employer, Potesta and Associates, Inc. of Charleston, WV.

The following categories will be utilized to organize our general areas of observation. In each area we will discuss program deficiencies, positive attributes and propose recommendations.

**Facilities**
Facilities have grown with the program. New space is currently being remodeled and expanded in the Morrow Library facility. In fact, underutilized and low-quality space is now good-quality, well-illuminated, laboratory and instruction areas filled with active students and faculty. Facilities in Prichard Hall have also been improved to accommodate computer equipment and web-based instruction. While constructed as a dormitory, this space has been renovated quite effectively.

**STUDENTS**
The growth of the program participants, from 19 in 1997 to the current number of 172 in 2003, indicates a definite interest on the part of a significant segment of the student body in such a program. Discussions with three individual students revealed enthusiastic support for the program as well as for Drs. Little and Jones. This support for the leadership and professorial capabilities of Drs. Little and Jones was adamantly expressed and was not the result of coxing. Dr. Taylor was not in the room during these discussions.

When asked why the students were so enthusiastic about the program, they thought the practical nature of the course work and the way it related to work opportunities were key to their feeling of support. Assessment of the test scores of these students indicates an above-average range, dismissing the notion that the IST program is somehow “watered down science.”

**CURRICULUM**
Curriculum consists of 33 semester hours in IST labeled courses in the 300-400 range and a complement of 15 additional hours in interdisciplinary sciences including chemistry (6 hours), public administration and management (6 hours), and physical geology (3 hours). As mentioned previously, the program provides for four options or ‘minor’ emphasis areas. Option #1 includes
traditional science curriculum in BSC coursework and allows the student to focus on interests in terrestrial, plant, aquatic systems or chemistry, data or geographic information. Option #2 provides a biotechnology focus. Option #3 provides a Geographic Information Systems (GIS) focus with emphasis on geography and physics; option #4 offers emphasis on environmental regulation and management.
The reviewers agree that the coursework is sufficiently rigorous and that all options have career applications in the local job market.

QUALITY OF EXPERIENCE
In support of the curriculum, quality experiences for students off campus during this course of study, is viewed as a positive. Opportunity for project activities outside the classroom were much appreciated by the students interviewed. They felt this gave them a head start in the field of environmental science and real knowledge about career choices—before graduation. They also enjoyed the broad scientific education emphasis over the “pipeline” or traditional degree tracks.

IMAGE
In McCoy’s current position, V.P. of an environmental consulting firm, he has several (6) graduates of Marshall University’s traditional graduate biology program. These individuals tend to view graduates of the IS&T program as technicians. McCoy and Hill understand that there are similar issues with the more traditional departments on campus. It is worth noting that two of the three students interviewed were planning to attend graduate school. Therefore, IS&T graduates are as prepared as their traditional counterparts for graduate degree programs.

Further evidence was provided by Dr. Little, who gave a summary of what graduates of the program had gone on to do. An impressive number of them have elected to attend graduate school. Further, SAT scores of IS&T students average higher than many traditional programs. On both points, this contradicts the current perception of the program.

These reviewers, both having undergraduate and graduate degrees from Marshall University, do not see a significant difference between the programs that would justify graduates of IS&T being considered technicians, any more than graduates of the traditional program. For practical purposes individuals graduating with a four year degree in either program will likely start employment, at least in the consulting sector, as field technicians. Only after several years of experience can they reasonably expect to secure an upper level scientist position. The abundance of individuals in the current job market with master’s degrees makes it just as easy to hire someone with a graduate degree as an undergraduate degree. Of the individuals working for Potesta & Associates, Inc. (McCoy’s firm) as environmental scientists, two have doctorates, thirteen masters, ten undergraduates and one no degree.

Since the Marshall IS&T program traces its origins to James Madison University, it would be interesting to see if this same image prevails at the JMU campus between the two programs. JMU or other similar programs may have addressed this perception issue in some way. It is recommended that Marshall contact JMU officials to determine if there are positive steps that can be taken to alleviate the current view of program graduates. The solution may simply be the test of time and the success of program graduates. The potential for use of various university
publications to improve the image of the program should be evaluated also.

RECOMMENDATIONS / REVIEWER COMMENTS

Facilities:
Facilities are improving for implementation of this program. Laboratory space, a requirement of any science program, is also advancing in quantity and quality. MU is recognized for this growth emphasis and is encouraged for its continuation. Additional space should be considered as such space may come available in conjunction with growth in the program. Construction of the new biotechnology facility adjacent to the current Science Building, may result in additional space availability for consideration by the program’s directors.

Students:
Students tend to be somewhat non-traditional, above average, and very enthusiastic—which is a distinct advantage. Those who do not envision academic careers are energized by this program which emphasizes hands-on experiences. Some have dropped out of traditional career tracks to pursue the IST degree for this reason. MU should be able to attract a continuous growth in student numbers entering this program by increasing outreach to high school counselors. Viewing the program as a workforce development opportunity, existing businesses in the tri-state area should be encouraged to further participate in internships and on-site experiences.

Curriculum:
Curriculum is adequate and builds on the JMU experience. As with all technological advances however, the experiences provided to students in various courses should carefully keep pace with changes implemented in current and future job markets. The options in traditional BSC disciplines, biotechnology Geographic Information Systems and environmental management are each viewed as viable career paths. The integrated array of scientific coursework accompanied by management and public administration provides IS&T graduates with a grounding in basic principles they will face in the current job markets primarily in government agencies and private consulting firms.

Communications / Image:
Marshall University should work to improve public understanding of this program—especially among on-campus peers. Facts about the high achievement levels of students, their job-placement potential, satisfaction and graduate school going rate should be amplified. This could lead to diminishing the inaccurate “bunny” image or that “watered down science” is being taught. Also see comment above on high school counselor outreach. Further, alumnae have strong outreach potential as word spreads through experience and job satisfaction. Positive indicators are already present in this regard and alumnae should be considered for additional outreach activities. Collectively, such efforts may lead to further growth of the program necessitating facilities expansion. Therefore many of these items are interrelated and the University is advised to plan accordingly.

Continuation and Growth Potential:
Currently this program seems to be attracting a large number of students but also seems to have distinct potential for growth. Marshall is encouraged to strengthen institutional support, building on the initial positive results and growing interest in IS&T. Since the quality of this program is not lacking and traditional College of Science curricula are geared toward
more academics, additional students are likely to gravitate to IS&T. This is especially true of those who do not plan to acquire more than a master’s degree. Also due to the quality of the curriculum however, students would not be prohibited or unprepared if, at a later date, they chose to pursue a doctoral program. Lastly, the university’s programmatic support must keep pace with incoming student demand while remaining sensitive to the ongoing evolution of current markets and workforce needs.

INDIVIDUAL GENERAL OBSERVATIONS

Dr. McCoy

Reviewer McCoy has worked with individual is the Virginia Division of Environmental Quality regional office in Harrisonburg, Virginia. These individuals have had high praise for graduates of James Madison University’s integrated program. They evidently use the graduates of that program to meet many of their needs. They were highly complementary of the program.

Dr. Hill

Reviewer Hill views this degree program as reflective of Marshall University’s efforts to meet modern needs of the 21st century job market. Not only are employers demanding a broadly-trained scientist and well-rounded individual, they also seek those with hands-on experience (I’ve hired many science and technology degreeed employees in federal, state and private settings). This program further exemplifies the trend toward the interdisciplinary nature of work teams and complex problem solving in general. Scientific investigation, from environmental perturbation to disease investigation to solving the human genome, has employed interdisciplinary education to tackle persistent problems. Even those students with “traditional” career tracks are forced to interface in a meaningful way with their peers from other disciplines. Even traditional degree programs change over time to reflect current needs (I recall a recent declaration by a Dean of Engineering that “all engineering majors will be required to take Biology” before graduation. Ten years ago this would have been considered heresy. ) Graduates with this type of training (broad, interdisciplinary, hands-on) are better prepared for the current job market. The MU Integrated Sciences program addresses this need.
Assessment Survey Website:
Environmental Science Alumni Information Survey

Give Us Your Demographic Information Below.

Your Age
- 21-25
- 26-30
- 31-39
- 40-49
- 50 and over

Your Gender
- Female
- Male

Your Race
- African American
- Asian
- Native American
- Hispanic
- White
- Other

Where did you reside most of your life before age 16?
- West Virginia
- Ohio
- Kentucky
- Other, Please specify State

Where do you reside now?

If you have relocated, please tell us why.
- For My Job
- For My Spouse's Job
- Family Reasons
- Other, Please Specify

If you did not graduate from MU, what years did you attend?

Did you receive a Bachelor's Degree from Marshall?
- Yes
- No
If you received a Bachelor's Degree from MU, in what year you received it?

If you received a Master's Degree, in what year did you receive your MU Master's Degree?

Did you attend graduate or professional school after leaving MU?

- Yes
- No

What was the highest degree completed?

- Bachelor's
- Master's
- Doctorate
- Other (Please specify)

Did you have an internship in your environmental science program of study?

- Yes
- No

If you did an internship, please list the location

Was the internship helpful in preparing you for your career?

- Yes
- No

Please indicate your level of satisfaction with the following aspects of Environmental Science at Marshall University.

Course Content
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Difficulty of Courses
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Variety of Courses
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Scheduling of Courses
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Internship
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Full-time faculty
- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable
Part-time Faculty

- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Overall quality of Instruction in Environmental Science

- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Environmental Science Academic Advising

- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Career Fair

- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied
- Not Applicable

Please indicate your agreement or disagreement with the following statements.

My ES courses increased my understanding of conceptual bases of the environmental science process.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

My ES courses increased my awareness of the practical realities of the environmental science process.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

My degree in Environmental Science provided me with an excellent pre-professional education.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Please provide the following information.

Were any ES Classes especially beneficial to you?

- Yes
- No

If yes, which ones? ____________________________________________________________________

Which courses would you recommend for Environmental Science students now enrolled at Marshall University?

____________________________________________________________________________________

The Environmental Science BS degree program includes the IST writing and communication sequence or the university sequence of ENG 101, 102, and CMM 103. Which writing sequence did you complete?

- IST communication sequence (IST 101, 120, 201, 220)
- University standard (ENG 101, 102, and CMM 103)

My writing and communication sequence... ____________________________________________________________________

- prepared me well for the communication and writing requirements of my job
prepared me adequately for the communication and writing requirements of my job
prepared me poorly for the communication and writing requirements of my job

Which math/analytical methods sequence did you complete?

- IST Analytical Methods sequence (IST 131, 230, and 231)
- Math sequence (MTH 225, MTH 122, and MTH 229)

My Math or Analytical Methods sequence...

- prepared me well for the quantitative part of my job
- prepared me adequately for the quantitative part of my job
- prepared me poorly for the quantitative part of my job

Were any ES faculty especially helpful to you in your ES education or in attaining important personal goals?

[ ] Yes  [ ] No

If yes, who? ____________________________

Please answer the following about your employment while a student and since graduation.

Did you work while attending Marshall?

[ ] Yes  [ ] No

If yes, please indicate your employment (you may choose more than one).

- Full-Time
- Part-time  Hours Per Week ______
- Work Study
- Graduate Assistant

Was your employment while attending Marshall environmental science related?

[ ] Yes  [ ] No

If yes, where were you employed? ____________________________

If yes, what was your job title? ____________________________

My present employment is:

- Environmental Assessment
- Environmental Policy or Planning
- Education
- Business
- Other, Please Specify ____________________________
If employed in an environmental field, work effort involves...

- preparing technical reports
- developing environmental plans
- gathering environmental data
- analyzing environmental data

What is your job/title? ____________________________________________

Please provide the name and address of your employer.

May we contact your employer as part of our evaluation? Our only concern is whether your college experience helped prepare you for success on the job. We will not contact your employer without your permission.

☐ Yes ☐ No

Please provide us with any comments, remarks or additional information you would like to provide concerning your education at Marshall University and/or the Environmental Science program at Marshall.

Thank you very much for your help with this survey. Please hit the submit button to send the information to us.

Submit Comments Clear Form
What Marshall University Has to Offer

Marshall University is one of West Virginia’s two largest state universities and is accredited by the North Central Association of Colleges and Schools. The focus at Marshall is quality teaching. This is achieved through a high level of interaction between faculty and students and a commitment to involve students in research and creative activities.

Campus facilities provide students with state of the art equipment and technology. Computer laboratories, residence halls and a technologically advanced library and information center are linked to modern, high-speed network communication systems capable of meeting the needs of students and faculty in the 21st Century.

The Robert C. Byrd Biotechnology Science Center and the Biotechnology Development Center will provide state of the art facilities for students and researchers in the biotechnology field.

For additional information, visit Marshall on the Web at http://www.marshall.edu

Integrated Science and Technology

Are you interested in a career using computers for programming, network security and computer investigation, database administration, or web application development?

Do you want a career in biotechnology? Would you like to use molecular genetics to clone genes and solve crimes? How about bioinformatics, where computers are used for cutting edge scientific research?

Does working in environmental science, whether for private industry or for the public interest you?

Would you like a program of study for your career that isn’t simply memorizing information? Would you like a “hands-on” experience from the very beginning? Would you like a program where student learning is the primary focus? Would you like to end up with a Senior Project you can be proud of?

If the answer to any of these questions is yes, you should join the Integrated Science and Technology Department at Marshall University!
What is a degree in Integrated Science and Technology?
The BS Degree in Integrated Science and Technology is a new and exciting degree program that is an alternative to traditional programs in science, technology, and engineering. We have brought together faculty and subject matter from engineering, physics, biological sciences, computer and information sciences, mathematics, communication studies and management to create an integrated degree program that meets the needs of today’s employers. As you progress through the program and specialize in an area, you will learn key scientific and technical skills that address critical demands for the 21st century. The Integrated Science and Technology Department includes a major in Computer and Information Technology or students can specialize in either Biotechnology or Environmental Science.

Visit us at http://www.marshall.edu/isat

Biotechnology
Specializing in Biotechnology prepares you to enter the work force in industrial, biomedical or environmental applications of biotechnology. Those in the biotechnology field can apply modern DNA and protein techniques to identify those responsible for violent crimes or develop the pharmaceuticals and diagnostic tests of the future. You will be trained in biological laboratories and develop the techniques used in laboratory settings of hospitals, universities, pharmaceutical companies and federal or state forensic laboratories. Recent graduates in biotechnology have interned at state police laboratories and are employed at both government and private research facilities.

Computer and Information Technology
The major in Computer and Information Technology (CIT) will prepare you to contribute to industrial, governmental, and educational computing in areas of communications and networking infrastructures, software systems, user interfaces for a corporate Intranet/Internet presence, and data asset management. Within CIT, IST offers courses specializing in: Network Administration (develop skills in network systems, network security, computer security, and computer forensics), Database Management (learn to effectively use distributed database systems, such as MySQL and Oracle), Web Application Development (learn to plan, manage, and develop Internet-based applications, including E-commerce systems), and Software Development (learn software processes, C++, Java, PHP, and VB.NET). Students in Computer and Information Technology obtain a broad background during their first two years and then choose a specialty in one of the areas based on their aptitude, preferences, and desired career.

Environmental Science
Graduates in Environmental Science will take advantage of the widespread opportunities provided by our society’s preservation and regulatory interests. Environmental Science students learn to use the most current technology and procedures to assess environmental quality of a wide range of ecosystems. Competence is developed in using Global Positioning Systems (GPS) to map features of ecosystems and in using Geographic Information Systems (GIS) software used to view and an array of digital maps and features. Field experiences range from testing water quality of local streams and wetlands to producing video of coral reef fishes. Students also have the opportunity to complete internships from government agencies, private environmental companies, and public interest groups such as watershed coalitions. Recent graduates have been accepted into prestigious graduate programs or found employment in the environmental divisions of a number of state, federal, and private environmental agencies.

A Career Focused Program
Your study in college should prepare you for a career. The Bachelor of Science (B.S.) degree in Integrated Science and Technology was designed to prepare you for the changing nature of science and technology fields. You will have a broad background in science and mathematics, strong applied computer skills and understand the impact of science and technology on society. To be ready for today’s competitive job market, the National Science Foundation has found that you need to be able to work in a team, be a capable written and oral communicator, have strong problem solving skills and be adaptable to learning new things in a rapidly changing environment.

Because traditional single-discipline majors in science and technology don’t always provide these additional skills, Marshall University offers a B.S. degree in Integrated Science and Technology.

Admission Standards
First-time full-time freshman entering a four year baccalaureate degree at Marshall University must have a H.S. diploma, minimum 2.00 GPA, composite ACT score of 19 (910 SAT) and completion of 2003 HEPC requirements (4 yrs English, 3 yrs Social Studies, 3 yrs Math, 3 yrs Science) for unconditional admission. Admission to the College of Science and the Integrated Science and Technology Department requires a composite ACT score of 21 (1000 SAT) and an ACT mathematics score of 21 (500 SAT) for admission.

Program Components
The Integrated Science and Technology program has five general components which are different from other degree programs in the College of Science. The components are:

- 40 credit hour General Education component that includes communication courses that combine writing and speaking skills, “connections” courses that examine the relationships between science and society, courses in literature, art and the humanities, work in a modern foreign language, social science courses, and public service.
- 26 credit hour Core that consists of analytical methods (mathematics), instrumentation courses with Visual Basic, and two science “Issues” courses that include work in living systems (biology), and energy (physics).
- 24 credit hours in Strategic Sectors, taken in the junior year, which provide background for specialization in particular areas.
- 21-24 hours in Biotechnology, Environmental Science, or Computer and Information Technology.
- 12-15 hours in science or technical electives.

The total credit hours required for the IST degree is 128.

Integrated Science and Technology
One John Marshall Drive
Huntington, WV 25755
Phone: (304) 696-6498
Email: isat@marshall.edu
http://www.marshall.edu/isat
I. Assessment Activities:

A. Program Goals:

The Department of Environmental Science has as its primary goals the education of undergraduates with sufficient in field knowledge and technical skills so as to be meaningfully employed in the assessment and management of environmental resources. Students must first meet General Education requirements that indicate an exposure to complete a core of IST environmental courses that provide basic understanding of environmental policy and the most current techniques in environmental assessment. They must supplement this environmental core with sixteen hours of traditional science. Students are encouraged to complete all requirements for admission into environmental science/policy graduate programs.

- Learning Outcomes/Data Collection:

  1. Learning Outcome: General Education

     What did you do? *Assessment of General Education is not an ES program requirement*

     How did you do it? *N/A*

     How many and what kinds of data did you examine? *N/A*

     What evidence do you have of the validity and reliability of your procedures? *N/A*

     How useful were the data in determining the validity and reliability of the outcome? *N/A*

  2. Learning Outcome: Technology Education

     What did you do? *Annual Review of IT Curriculum*

     How did you do it? *Curriculum Planning Retreat Fall of each year*

     How many and what kinds of data did you examine? *Employment record of past graduates and review of curriculum of similar programs*

     What evidence do you have of the validity and reliability of your procedures?

     *Discussion of assessment with James Madison University Environmental Studies*

     How useful were the data in determining the validity and reliability of the outcome?

     *Useful*

  3. Learning Outcome: Science Education

     What did you do? *Reviewed Curriculum requirement with professionals from Federal and state regulatory and assessment agencies*

     How did you do it? *Set up and met with Advisory Committee*

     How many and what kinds of data did you examine? *Written assessments by Advisory Committee*
What evidence do you have of the validity and reliability of your procedures?

*High level of graduate employment in field*

How useful were the data in determining the validity and reliability of the outcome?

*Verified employment of graduates*

4 Learning Outcome: Lifelong Learning Skills
   Communication Skills
   What did you do? *Questionnaire of prospective employers*
   How did you do it? *Developed and submitted questionnaire*
   How many and what kinds of data did you examine? *Results of questionnaire*
   What evidence do you have of the validity and reliability of your procedures?
   *Reports from graduates on communication skills*
   How useful were the data in determining the validity and reliability of the outcome?
   *Useful*

Analytical Skills
   What did you do? *Review of math skills with math professionals*
   How did you do it? *Inclusion of math faculty and environmental professionals on planning committees.*
   How many and what kinds of data did you examine? *Curricular requirements From similar programs*
   What evidence do you have of the validity and reliability of your procedures?
   *High retention rate in Analytical Methods courses*
   How useful were the data in determining the validity and reliability of the outcome?
   *Useful*

• Results:
   What did you find out? *IT portion of curriculum needs significant revision*
   Describe the results. *Department has spent past 4 months working on this revision*
   What conclusions did you draw related to your data collection procedures?
   *Need to better track employment record of graduates*
   Relate your data to the outcome.
   *To date results of assessment have not been quantified*
   What improvements/revisions in the program/outcome have you made or are considering making based on what you learned?
   *Set up system to quantify results*
   The results may be displayed in chart/table form in addition to a brief narrative.

II. BOT Initiative 3 Compliance:

Knowledge and Skills Assessment of Graduates:

National Standard
III. **Plans for the current year:**

What are your goals/plans for the current year and how do you hope to meet these goals/plans?

*Development of “Area of Emphasis” called “Transportation and the Environment”*

*Development of coursework in GIS and CAD*

What things will you do differently?

*Improvement of Advising Scheme*

What activities will you add/delete?

*Add: GIS and CAD coursework*

*Delete: No deletions necessary at this time*

What changes in your assessment plan are you considering?

*Questionnaire to graduates; follow up to perspective employers*

IV. **Assistance Needed:**

Given your plans for the current year=s activities, what kind of assistance from the UAC do you need?

*Assistance in developing student questionnaire*

On which topics would you like more information or assistance?

*Format for student questionnaire*

V. **What one most important thing has the department/program learned through this process?**

*Need for follow up questionnaire with graduates*
Chart I: Assessment Summary
Marshall University

Assessment of Student Outcomes: Component/Course/Program Level
5 year summary

Component Area/Program/Discipline: Environmental Science B.S.

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Person or Office Responsible</th>
<th>Assessment Tool or Approach</th>
<th>Standards/Benchmark</th>
<th>Results/Analysis</th>
<th>Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Critical Thinking and problem solving skills in Environmental Science</td>
<td>Faculty</td>
<td>Senior project 490 and 491 presentations. Senior project consultations, environmental core courses, and IST Connections courses.</td>
<td>Demonstrate understanding of a priori and post hoc data analysis and capacity to distinguish between scientific methods of agreement and difference as scientific data in tabular form are related.</td>
<td>Student understanding is adequate but most students presently only totally truly understand these complex relationships in graduate school or work experience.</td>
<td>Increased emphasis on relating hypothesis testing to data table construction in IST 423</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>2. Written and oral communication skills in Environmental Science.</td>
<td>This responsibility falls on the instructors in the 12 hr. communications/connections block of courses as well as instructors of IST 320, 321, 322, and 323.</td>
<td>Weekly written papers and term papers in addition to oral presentations will be the tool.</td>
<td>Demonstration of clarity of thought and in written and speech form during IST 490 and 491 presentations. Papers and presentations in environmental core classes.</td>
<td>The repetitive nature of student experience in the development of presentations has resulted in students demonstrating significant maturity in communication skills. However, students still lack the capacity to develop project plans independently.</td>
<td>Better focus on project development and planning in IST 490.</td>
</tr>
<tr>
<td>3. Students will have specific skills in environmental mapping and assessment.</td>
<td>Faculty</td>
<td>Student performance on projects and presentations in IST 322, 323, 423, 490, and 491.</td>
<td>Student demonstrates competence in such standard water and/or stream assessments as EPA Rapid Bioassessment. Cowardin wetland or Rosgen stream classifications and terrestrial mapping of vegetative and geological features</td>
<td>Discussion with employers of graduates from US COE, WV DEP, and private consulting companies indicates students take these knowledge into the workplace</td>
<td>Continuation of the education experience for students with updates of methodologies through consultation with professionals in field</td>
</tr>
<tr>
<td>4. Students will have the capacity to apply math skills to problem solving</td>
<td>Faculty</td>
<td>Students able to apply parametric and nonparametric tests to hypothesis testing in IST 322 and 323; able to integrate differential functions into systems and model development in IST 131, 230, and 231.</td>
<td>Statistical Applications in IST 322 and 323 as well as in the design of projects in IST 490 and their execution in IST 491</td>
<td>While math skills improve dramatically during the analytical methods course sequence, the poor math backgrounds of many students are still evident in their senior year.</td>
<td>Increase tutorial help for students in IST 131, 230, and 231. Tutorial program for these students initiated in fall of 2005 for IST 130. Progress of students who received tutoring will be monitored through IST 131, 230, and 231.</td>
</tr>
</tbody>
</table>