

HSU Academic Program Criteria

Academic Program in Biometry

I. The Vision for Humboldt State University (Limit: 2 pages) [15%]

Describe up to 5 curricular or co-curricular features of the program that are consistent with the Vision of HSU, and indicate which aspect(s) of the Vision align with that particular feature. Please provide sufficient information such that an individual unfamiliar with your program will clearly understand the feature's relevance.

Introduction: What is Biometry?

The term “Biometry” at Humboldt State University means, “statistical techniques applied to the biological and natural resource sciences.” Several of the majors in the Biological and Natural Resource Sciences require their students to take BIOM 109L, which is an elementary statistics course with a pre-calculus prerequisite. The Biometry Minor was formed to address the need for additional opportunities for students studying in the College of Natural Resources and Sciences to gain a more substantial background in statistics. In fact, it is not the program that is of critical importance as much as it is the opportunity for students to take intermediate, multivariate, and advanced statistical topics so that they may fully participate in research activities – either as advanced undergraduates or as graduate students. The “minor” program was created so that a student could earn recognition for their study of advanced statistical topics.

Co-Curricular Feature – Interdisciplinary Study of the Environment

We will be the premier center for the interdisciplinary study of the environment and its natural resources.

Although the administration of the Biometry courses occurs through the mathematics department and the leadership of Professors Rizzardi, Kim, VanKirk, and Stauffer, the program also employs the expertise of key faculty across the CNRS. Current faculty include Professor Crawford of Oceanography, Professor Hankin of Fisheries Biology, and Professor George of Wildlife. Recent faculty have also included John Pequenaout of Oceanography and Bill Sise and Bill Bigg of Forestry and Wildland Soils. This team of faculty delivers an outstanding set of courses that naturally support an interdisciplinary view of statistics and data analysis.

II. Demand (Limit: 1.5 pages per option, not including tables) [20%]

A. Internal demand for the degree program and courses in the degree program

1. Headcount Data

Minors enrolled AY Average in Biometrics minors_enrolled_BIOM report generated: 06-MAR-08								
CLASS	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Soph	0	0	0	0	0	0	0	1
Jr	0	0	1	1	0	1	0	0
Sr	6	3	0	0	2	2	1	2
Grad	0	0	0	0	0	0	0	1
	6	3	1	1	2	2	1	3

Minors Awarded by Year in Biometrics minors_awarded_BIOM report generated: 25-JUN-08								
MINOR	AY 99/00	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07
Biometrics	3	4	2	0	2	0	0	0

2. FTES by Course Code

FTES taken in Biometrics classes by Majors (AY 02/03 - AY 07/08) course_ftes_smry_BIOM report generated: 30-JUN-08								
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BIOM	Lower-div	Biology	11.1	12.9	10.0	10.5	11.6	14.0
		Wildlife	7.3	7.7	3.5	6.7	7.9	6.7
		Zoology	3.3	2.5	2.0	2.5	3.6	4.1
		Forestry	3.5	3.5	2.3	2.9	3.6	3.5
		Environmental Science	3.6	3.2	3.3	1.6	3.3	3.1
	Sub-total		39.8	42.3	31.8	33.2	39.2	42.2

FTES taken in Biometrics classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_BIOM report generated: 30-JUN-08								
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BIOM	Upper-div	Fisheries Biology	2.3	2.7	3.1	1.3	1.9	1.6
		Environmental Science	1.7	1.6	.8	1.7	.5	1.3
		Biology	.3	.7	1.2	.8	.5	1.3
		Natural Resources (Forestry)-Grad	.0	.0	.2	.0	.2	.8
		Biology-Grad	.7	1.5	.5	.7	.7	.8
	Sub-total		7.5	9.3	8.6	6.1	6.5	8.1

FTES taken in Biometrics classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_BIOM report generated: 30-JUN-08								
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BIOM	All Levels	Biology	11.3	14.0	11.4	11.6	12.3	15.3
		Wildlife	8.1	8.5	4.3	6.8	8.7	7.1
		Environmental Science	5.5	5.2	4.3	3.6	4.1	4.8
		Fisheries Biology	5.3	5.5	5.9	3.6	5.9	4.7
		Zoology	3.3	2.7	2.0	2.5	3.7	4.4
Total			58.2	63.3	52.3	51.6	53.8	56.7

3. Service to other HSU program/options

Document other HSU programs/options (including, GE) with required coursework from your program

Other HSU program/option name	Courses required List course number and units	Restricted elective courses List number and units
Biology	BIOM 109 (4)	
Biology – Ecology Emphasis		BIOM 333, BIOM 408 (4)
Botony	BIOM 109 (4)	
Chemistry – Env. Tox.	BIOM 109 (4)	
Chemistry – Chem. Tech	BIOM 109 (4)	
Environmental Science	BIOM 109 (4)	
Fisheries Biology	BIOM 109 (4)	BIOM 333, 406, 408, 508, 510 (4)
Forestry	BIOM 109 (4)	
Geology		BIOM 109 (4)
Applied Math		BIOM 109 (4)
GIS	BIOM 109 (4)	

	BIOM 333 (4)	
NRPI (Planning)	BIOM 109 (4)	
Oceanography	BIOM 109 (4)	
Pre-Prof. Health	BIOM 109 (4)	
Range	BIOM 109 (4)	
Biology Education	BIOM 109 (4)	
Wildland Soils	BIOM 109 (4)	
Wildlife	BIOM 109 (4)	BIOM 333, 406, 408, 508 (4)
Zoology	BIOM 109 (4)	

4. Comment on the internal demand **FOR EACH OPTION** of the Major. Explain any significant changes in internal program demand over past 7 years. Provide any additional relevant information of internal demand.

The demand for courses in Biometry has changed little over the past 7 years. Students recognize that background in statistics will help them accomplish research goals and prepare for the next level of education. However, the number of biometry minors has dropped to almost 0. A marketing plan for the program may help.

B. External demand for “graduates” from the program

Imagine you are answering a parent’s question about job prospects and the demand for graduates of your program/option. Describe evidence of external demand for this program. Evidence may be cited from one of the following sources: the State of California <http://www.labormarketinfo.edd.ca.gov/>, the US Department of Labor <http://www.bls.gov/OCO/>, the National Association of Colleges and Employers, <http://naceweb.org>. Evidence may be cited from an additional source from, for example, a professional society relevant to your discipline.

It would be speculative to say that a minor enhances demand for a graduate in Biological Sciences or Natural Resources. Conventional wisdom says that preparation in statistics relative to your field of study strengthens your application for graduate school and/or your job prospects. This quantitative supplement to a student’s major can make students eligible for the growing number of jobs that don’t have “statistician” in the job title. Consider the following from the US Department of Labor’s 2006 Occupation Outlook:

“The demand for individuals with a background in statistics is expected to grow, although some jobs will be in occupations with titles other than “statistician.”

The use of statistics is widespread and growing. Statistical models aid in decision making in both private industry and government. There will always be a demand for the skills statistical modeling provides. Technological advances are expected to spur demand for statisticians. Ever faster computer processing allows statisticians to analyze greater amounts of data much more quickly, and to gather and sort through large amounts of data that would not have been analyzed in the past. As these processes continue to become more efficient and less expensive, an increasing number of employers will want to employ statisticians to take advantage of the new information available.”

III. Program Quality (Limit: 6 pages, not including tables) [30%]

A. Students

1. For undergraduate programs

Provide evidence indicative of program quality related to student learning (e.g., patterns of student achievements in discipline-specific contexts such as special honors or awards, publications, presentations; passing rates on professional examinations; proportion of students who are admitted to graduate school and/or employed in a disciplinary field; and so on – as appropriate for your discipline).

None is available

B. Faculty

1. Provide evidence of teaching effectiveness and commitment to continuous improvement of teaching. Include, for example, engagement in professional development for teaching (including around campus themes on learning outcomes and diversity, and on accessibility training), program approaches to ensure quality, and/or recognitions, honors, and awards for excellence in the classroom as appropriate for your program.

The Program faculty are leaders in their disciplines and as such have demonstrated a commitment to continuous improvement in teaching, participating in workshops on Universal Design, Diversity, Writing across the Curriculum, GE learning outcomes, and Mid-Semester Evaluations.

An example of commitment to continuous improvement to teaching that is relevant for this interdisciplinary program comes from our newest statistics faculty member Rob VanKirk:

During AY 2005-2006, I received a National Science Foundation grant under the Interdisciplinary Grants in Mathematical Sciences program. The purpose of the grant was to expand my ability to teach and conduct research in an applied science field, in this case, water resources. The grant funded a sabbatical year spent at the Idaho Water Resources Research Institute at the University of Idaho. During that year, I had the opportunity to develop and teach courses outside of the traditional mathematics and statistics courses I would normally teach in a mathematics department. These courses were quantitative hydrogeology, water resources management, and mathematical methods in hydrogeology (short course for working professionals). Through this experience I improved not only my ability to teach in an interdisciplinary environment but also my effectiveness at teaching disciplinary mathematics and statistics courses, given that most students in these courses major not in mathematics but in a science or engineering discipline.

As a new faculty member at HSU, I attended two days of new faculty orientation, about half of which was devoted to Universal Design for Learning, which emphasizes the themes of student learning, multiple assessment methods, and accessibility. The two-day orientation will continue throughout the semester as a weekly seminar, in which we will continue to learn and discuss these themes.

2. Evidence of faculty engagement in scholarship/creative activities and service. (Express as a percentage of full-time or FERP faculty members **affiliated with the program**. For example, if 9 of 10 faculty affiliated with your program gave a paper at a professional meeting in 04/05, then enter $9/10 = 90\%$.) This table is to be completed by the department.

The following table is based on the work of the four main statistics faculty members in the mathematics department: Yoon Kim, Mark Rizzardi, and Rob VanKirk.

Scholarship/Creative Activities/Service	05/06	06/07	07/08
At least one peer-reviewed publication or creative product	33	67	67
At least one funded grant or contract related to scholarship	67	100	100
Invited participant or leader of workshops, expert panels, or task forces	33	33	33
At least one presentation (paper, poster, exhibition, etc.) given at a professional society meeting	67	67	33
Professional service activities at a regional or national level	67	67	67
Service on at least one university or college-level committee (at least 1 hour/wk avg.)	33	67	67

3. Provide explanations of the data above and/or descriptions of the patterns of faculty engagement in scholarly and/or creative activities and service as appropriate for your program.

The faculty engagement in scholarship is balanced between refereed papers, professional service (such as reviewing for journals), grants and contracts, and presentations.

4. Provide evidence for faculty mentoring of students. Include, for example, approaches to advising, directed study or research, and/or clubs or student professional chapters that involve faculty mentorship.

All three of the main statistics faculty (Kim, Rizzardi, VanKirk) report spending 2 – 4 hours per week on statistical consulting for advanced undergraduate and graduate students in the CNRS. This work provides an invaluable resource for the CNRS programs, particularly those that are working to promote engagement of undergraduate students in research projects.

5. Other evidence of quality indicators related to faculty that may not be listed elsewhere, including, for example, faculty diversity within the program.

33% of our main statistics faculty are diversity faculty.

C. Curriculum (differentiate by option, if appropriate)

1. Writing and oral communication learning outcomes
Describe how written and oral communication skills are included in your program.

Every course in the Biometry Program has a laboratory component. Students write involved laboratory reports and are evaluated on the quality of the writing in these reports. In graduate-level courses, students also submit written project work that must be submitted in publishable form.

2. Assessment

[Data on program progress with assessment tasks will be provided from the Faculty Associate for Assessment]

Provide 2 examples of how you have used results of assessment of your program's student learning outcomes to adapt, enhance, or affirm your program's curriculum.

The only assessment done to date has been on the General Education learning outcome for BIOM 109. There were three aspects to student work that were evaluated, conceptual understanding, reasoning, and Communication. The rubric is included here for reference.

	Beginning 0	Developing 2	Accomplished 3
Concepts/Understanding	<p>No solution or the solution has no relationship to the task.</p> <p>Inappropriate concepts are applied.</p> <p>Solution addresses none of the mathematical components presented in the task.</p>	<p>Incomplete; parts of the problem were not understood.</p> <p>Solution addresses some, but not all of the mathematical components in the task.</p>	<p>Demonstrates a broad understanding of the problem and the major concepts necessary for its solution.</p> <p>The solution addresses all of the components presented in the task</p>
Strategies/Reasoning	<p>No evidence of a strategy or procedure, or uses a strategy that does not help solve the problem.</p> <p>Little or no evidence of mathematical reasoning.</p> <p>So many errors in mathematical procedures that the problem could not be resolved.</p>	<p>Uses a strategy that is partially useful, leading some way toward a solution, but not to a full solution of the problem.</p> <p>Some evidence of mathematical reasoning.</p> <p>Could not completely carry out mathematical procedures.</p> <p>Some parts may be correct, but a completely correct answer is not achieved.</p>	<p>Uses an efficient strategy that leads to a solution of the problem.</p> <p>Uses effective mathematical reasoning.</p> <p>Mathematical procedures used accurately.</p> <p>All parts are correct and a correct answer is achieved.</p>

Communication	No explanation of the solution, explanation cannot be understood or is unrelated to the problem.	Incomplete or not clearly presented explanation.	Clear explanation used.
	No use or inappropriate use of mathematical representations (e.g. figures, diagrams, graphs, tables, etc.).	Not all steps included.	All steps are included.
	No use, or mostly inappropriate use, of mathematical terminology and notation.	Some use of appropriate mathematical representation.	Appropriate use of accurate mathematical representation, as well as mathematical terminology and notation.
		Some use of appropriate mathematical terminology and notation.	

The results of the assessment are summarized as follows:

Only 13% of students were ranked at the beginning level in all three categories, with the majority at the “developing” level in each category. Communication was the strongest category with 54% at the accomplished level.

3. Accreditation (if applicable)

If the program is accredited, describe the need for this accreditation and its impact on the quality and composition of the curriculum of the program.

Not applicable

4. Relevance and innovation

Provide evidence through examples that demonstrate a curriculum that is relevant, innovative, forward looking, responsive to changing trends, and equips students to function in a diverse, global context.

The faculty who teach in the biometrics program are either active researchers in their fields or working statisticians. FERP faculty Howard Stauffer recently completed a book on Bayesian Statistics and now uses it for teaching BIOM 510 and a special statistics course for Math Modeling Graduate students. Professor Kim is close to completing a book on linear models and does statistical consulting for the movie industry, and Professors Rizzardi and Van Kirk apply statistical methods in ecology and land use contexts in their own and other’s research projects. These activities are transferred directly into the classroom illustrations and sample data.

5. Interactions between graduate and undergraduate programs (if applicable)

If this is a graduate program, what opportunities for undergraduates result (or are lost) by virtue of the graduate program.

Not applicable

6. Program uniqueness

If your program provides unique educational opportunities or course content that is found at few or no other CSU institutions, please describe this uniqueness.

We know of no other truly interdisciplinary statistics program in the CSU in which faculty from other department work together with a group of statisticians in the math department to deliver courses that directly help students with their research efforts.

7. Opportunities for undergraduate scholarship/creative activities/service

Estimate the percentage of your undergraduate majors that participate in scholarship/creative activities/professionally-related service, and provide some illustrative examples of such activities. Can students receive academic credit for these activities and have them counted toward undergraduate major requirements?

Opportunities are not created in the Biometry program, but CNRS students are empowered to take advantage of the opportunities in their own disciplines through the quantitative support they receive from the faculty and courses in the Biometry Program.

D. Affiliations/Equipment/Facilities/Environment

1. Affiliations

Some academic programs are affiliated with on-campus or off-campus centers, units or institutes that bring important benefits to programs. For any such center/unit/institute, please provide (1) the name of such center/unit/institute, and very brief descriptions of (2) the purpose of the center/unit/institute, (3) the nature of your program's affiliation with the center/unit/institute, and (4) the benefits accruing to your program/major from your affiliation with this center/unit/institute.

Units/centers/institutes may be public (HSU, CSU, local, state, federal) or private.

Not applicable

2. Facilities and resources

Provide a brief listing of your most important facilities, equipment and information/library resources, and describe the degree to which the current facilities, equipment and information/library resources affect program quality.

Students in the Biometry courses make use of statistical software and the CNRS computing facilities in FOR 204A and BSS 313. Without these resources, the program would be hard-pressed to function.

3. Unique local and regional environment

Describe how the program takes advantage of the unique local or regional social, cultural and/or natural environment available to students and faculty at HSU. (Do not include items listed under D1.)

The program is enhanced by the consulting work that the faculty do through grants and contracts. However, the mix of biological and natural resource sciences is what makes the interdisciplinary approach in this program possible. It is the unique mix of programs in the CNRS at HSU that is the key local environment that enhances the Biometry Program.

IV. Investments, Revenues, and Efficiencies (Response Limit: 2 pages of narrative, not including tables) [20%]

A. Program Investments

1. Program Investment – Degree Requirements

Enter the total number of required course units (as listed in the catalog) for this academic program, and then the number of required course units for this academic program that are from the primary course code associated with your program. Provide a total for each option if appropriate.

Student Units

Total required Program SCUs	25	Required Program SCUs in the primary Course Code	16
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Weighted Teaching Units (WTU's)

Total the number of WTUs required to teach 1 section of each of the required courses in the program. If there are lists of restricted electives (e.g., take 1 of the following 3 courses), then choose a representative course from the list. For required S-factor courses, estimate the typical number of WTU's assigned to a faculty member who teaches the course. Again, differentiate by option if appropriate.

Total Required Program WTUs	26.2	Required Program WTUs in the primary Course Code	17.2
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2. Program Investments – by staff allocations.

Estimate the percent of departmental expenditures for that can be attributed to this academic program. Provide an explanation, as appropriate.

	Major Program
Percent of Staff FTE	10%

Staff FTE

	1/31/2004		1/31/2005		1/31/2006		1/31/2007		1/31/2008	
MATH	Count	Sum	Count	Sum	Count	Sum	Count	Sum	Count	Sum
R07	2	1.50	2	1.50	2	1.50	2	1.50	3	1.40
Total	2	1.50	2	1.50	2	1.50	2	1.50	3	1.40

3. Program investment – by Minimum Weighted Teaching Units required to offer coursework so students can make reasonable progress toward their degree.

Complete the table below using the definitions that follow. Include additional columns as needed.

Total WTU in Course Code	WTU for GE and service to other academic Programs	WTU for Biometry Minor
119.1	119.1	0

Since there have been no minors awarded in the past 3 years, it is appropriate to acknowledge that all of the BIOM courses are intended as service and/or GE area B courses.

Total WTU in Course Code: Sum up the total number of WTU that were used to teach courses in the primary course code associated with your academic program **over the past two academic years**. Exclude remedial courses.

Service to GE and other Academic Programs: Enter the total number of WTU that were used **over the past 2 years** to meet service demands imposed by students outside the major. (In other word, if 8 sections of Egyptology 301 have been offered over the past 2 years, but if 2 sections over the past 2 years would have been sufficient for the Egyptology majors, then count 6 sections of Egyptology, and the associated WTU, in this category.)

WTU for Major Option (s): Sum up the non-service WTU for the set of courses in the course code associated with your program that you would need to offer **over a two year period** to accommodate progress toward degree for your program students.

4. Program Investments – Other annual costs.

Provide dollar estimates for other program costs by the following categories. Annualize periodic costs (equipment purchases or facilities upgrades) as necessary. Include an explanation, if appropriate. Do not include costs for commonly used items (smart classrooms, faculty workstations, etc.).

The following estimated costs are 10% of the costs listed in the Math academic program report.

Category	Estimated Cost
Equipment (including maintenance)	\$250
Instructional Supplies	\$1170
Temporary Help (graders, lab assistants, GA's, etc.)	\$1034

5. Program Investments – accreditation [if applicable]

If this program is accredited, describe how this accreditation effects program costs.

B. Gross Revenues

Since the BIOM course offerings are interdisciplinary, it is difficult to identify “revenue” other than student lab fees. See the math program report for revenue information for the math department. The only identifiable revenue for the Biometry course are the CNRS lab fees.

Revenue	05/06	06/07	07/08
DEPARTMENTS COMPLETE THIS SECTION			
Fundraising/donations			
Extended Education			
Student fees	6500	7060	7120
Instructionally Related Activities (IRA)			
Instructionally-related grants			
Grants and contracts to P.I.s			
Other revenues			

Provide an explanation for how these revenues support the academic program.

The student lab fees go toward printer supplies in the CNRS labs and the annual subscriptions costs for statistical software. These two uses for the lab fees account for only 10 – 15% of the Biometry fees that are generated. Thus it is fair to say that the fees go to support consumable costs in other labs across the CNRS.

C. Efficiency

1. Efficiency – By SFR for course code

Academic Year Averages	Subject	02/03	03/04	04/05	05/06	06/07	07/08
SFR	BIOM	19.95	24.44	25.02	25.21	20.99	22.84
FTEF	BIOM	2.93	2.59	2.09	2.05	2.57	2.48

SFR SUMMARY	02/03	03/04	04/05	05/06	06/07	07/08
AHSS	20.36	22.05	21.94	20.61	21.19	22.91
CNRS	15.66	16.90	17.17	16.04	16.82	18.28
CPS	15.12	16.29	15.68	15.22	20.80	25.33
UNIVERSITY TOTALS	17.28	18.65	18.57	17.52	19.32	21.43

Explain any substantial changes in SFR. Also explain why this SFR differs from the college and/or university SFR. What efforts have been made over the past few years by the program to improve this measure of efficiency? Use the data under part IV.E. as appropriate.

2. Efficiency – Other views.

The Prioritization Task Force will examine the data given under section IV.A and B in terms of the overall production (e.g. number of majors, number of graduates) in the program. Please comment if appropriate.

D. Budget cut impacts

Indicate how your program has been affected by recent (since 2002-2003) budget cuts that have directly affected resources for your program (faculty, staff, operating expense) and course offerings (class size, reduced course offerings or options for the major.) Refer to the data included under section IV. E. or in the departmental report as appropriate.

The main program change related to budget has been in BIOM 109 where we have had to replace multiple lectures of size 25 with “triple lectures” of size 75 – and some lectures of size 100. This change in lecture size has not been welcome by faculty who have less opportunity to monitor and understand student progress in the discipline. If budgets allowed, the faculty would favor “double lectures” of size 50, with two lab sections accompanying the lectures.

E. Additional Data

Course Offerings Profile in Biometrics (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Distinct Courses Enrolled	6	5	6	6	5	5	4	5
Sections Enrolled	12	12	12	15	12	12	11	13
Average Section Enrollment	22	22	21	26	25	25	26	28
Distinct Courses Enrolled in Biometrics by Level (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	1	1	2	1	2	2	1	1
Upper-div	3	2	2	2	2	2	2	2
Graduate	3	2	2	3	2	2	2	2
Total	6	5	6	6	5	5	4	5
Sections Enrolled in Biometrics by Level (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	7	8	8	10	8	8	8	9
Upper-div	3	2	2	2	2	2	2	2
Graduate	3	3	2	3	2	2	2	2
Total	12	12	12	15	12	12	11	13
Avg Section Enrollment in Biometrics by Level (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	28	26	25	30	27	29	30	35
Upper-div	16	19	14	17	19	15	15	14
Graduate	12	11	16	14	18	19	16	9
Total	55	57	54	62	64	62	61	58
FTES in Biometrics by Course Level (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	36.6	42.2	40.0	42.3	31.8	33.2	39.2	42.2
Upper-div	9.2	8.8	7.5	9.3	8.6	6.1	6.5	8.1
Graduate	9.9	8.4	10.9	11.6	12.0	12.2	8.1	6.4
Total	55.7	59.5	58.3	63.3	52.3	51.6	53.8	56.7

NOTE: In the above tables all class sections have 2 or more students enrolled. This is done to minimize the influence of independent student sections.

Distinct Courses count each distinct SUBJ/Course-number combination enrolled.

All figures are Fall/Spring term averages. Due to the rounding of average Academic Year counts, the various breakouts may not add to the exact same amounts.

Other Class Offering Breakouts

These examine independent study sections, and sections by different modes of instruction. The Lecture-only sections have only a C1 through C6 mode. The Lab/Activity-only sections have only a C7 through C-16 mode. Other modes and combinations contain the remaining modes or combinations of lecture and lab/activity modes.

Other Special breakouts in Biometrics (AY 00/01 - AY 07/08) class_offerings_BIOM report generated: 27-JUN-08								
	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Sections with 1 student enrolled	0	0	0	0	0	0	0	1
Lecture only sections	2	2	1	3	3	3	2	2
Lab/Activity only sections	2	2	2	7	5	5	5	7
Other modes and combinations	8	8	9	5	4	4	5	4

V. Potential (Please complete this section for each option. Limit: 2 pages per option) [15%]

A. Program capacity with existing resources:

1. What is your program's maximum capacity with current resources? Use two metrics to define "capacity": The number of graduates per year, and the number of FTES generated by courses that are unique to this option, per year.

(Completed by the department)	Graduates per year	FTES in the major option per year
Existing	0	N/A
Maximum capacity with existing resources	15	N/A

2. If your program is at maximum capacity, proceed to part B. If you have capacity to grow with existing resources, what steps have been taken to increase enrollment? What have been the effects of these steps, and what results are still anticipated?

We have not been making efforts to increase enrollment. The undergraduate major requirements have been sufficient motivation for populating BIOM 109 and BIOM 333. The other courses in the minor could benefit from greater publicity, but essentially serve the needs of advanced undergraduates and graduate students - and are thus typically limited to a specific audience.

B. Opportunities for future growth or substantial curricular changes

1. What opportunity does the program have for future expansion? Provide evidence for your response.

There are two specific opportunities for program expansion through the creation of another program that requires a strong statistical component. One is the creation of a Bioinformatics (or Mathematical Biology) Program. Such a program combines Biology, Computer Science, and Math/Statistics and produces graduates who are ready to work in the Biotech fields. A second is the creation of an actuarial science option in mathematics. This program requires a year or more of intense statistical work, which would enhance the demand for the existing courses of BIOM 333 and BIOM 508, and create demand for more mathematical statistics.

In addition to these two potential opportunities, the CNRS could look toward creating a major program in Biostatistics. The potential external demand for such a program is evident in the US Labor Department's 2006 Occupation Outlook, which says,

“The demand for individuals with a background in statistics is expected to grow, although some jobs will be in occupations with titles other than “statistician.”

The use of statistics is widespread and growing. Statistical models aid in decision making in both private industry and government. There will always be a demand for the skills statistical modeling provides. Technological advances are expected to spur demand for statisticians. Ever faster computer processing allows statisticians to analyze greater amounts of data much more quickly, and to gather and sort through large amounts of data

that would not have been analyzed in the past. As these processes continue to become more efficient and less expensive, an increasing number of employers will want to employ statisticians to take advantage of the new information available.”

2. Describe the curricular changes and/or staffing increases required to accomplish such an expansion?

The staffing for Biometry is currently sufficient for accomplishing expansion that would be tied to a new major option like Bioinformatics or Actuarial Science. The existing courses would have to be offered more frequently.

To accomplish a major in statistics would require an additional 4 courses that would be offered over the course of 2 years, and at least one additional statistics faculty member.

C. Impact of augmented resources

Suppose that your program were ranked in a category that recommended augmentation of resources. What would be the impact of augmented resources? (Answer for a 10% augmentation and a 20% augmentation.)

10% Reduction: The Biometry program currently offers 4 – 5 courses per year other than BIOM 109. A 10 percent reduction in resources would reduce that number to 3 – 4 courses per year.

20% Reduction: The Biometry program would reduce the number of courses above BIOM 109 to 2 per academic year.

D. Impact of reduced resources

Suppose that your program were ranked in a category that recommended reduction of resources. What would be the impact of reduced resources? (Answer for a 10% reduction and a 20% reduction.)

10% Reduction: The Biometry program currently offers 4 – 5 courses per year other than BIOM 109. A 10 percent reduction in resources would reduce that number to 3 – 4 courses per year.

20% Reduction: The Biometry program would reduce the number of courses above BIOM 109 to 2 per academic year.

E. Impact of program elimination

Suppose that your program were recommended to be discontinued. What would be the impact of program elimination?

Eliminating the Biometry Minor would have little effect as long as the Biometry courses could still be offered to support Biological and Natural Resource Science advance undergraduate students and graduate student who need this quantitative supplement so that they can fully participate in research activities. One other alternative is to designate a significant portion of statistical faculty time to provide consulting services to graduate students in the CNRS. Currently, it is the advanced undergraduate and graduate courses that provide such service – and do so with efficiency because of the students who gather around common research interests and methodologies.