7. Special Consideration

**College of Science**
Department of Biology
Minor in Bioinformatics
Request for a new minor
SPECIAL CONSIDERATION
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COLLEGE OF SCIENCE
DEPARTMENT OF BIOLOGY
MINOR IN BIOINFORMATICS
REQUEST FOR A NEW MINOR
MEMORANDUM

TO: Dr. Timothy Scott, Associate Dean for Undergraduate Programs and Development
FROM: Thomas D. McKnight, Professor and Head of Biology
SUBJECT: Bioinformatics Minor

Attached are the forms to establish a bioinformatics minor. Although we propose that the minor be administratively housed in the Department of Biology, we have structured the required and elective courses to allow participation by students from a wide variety of departments across campus. Departments or programs that are responsible for non-BIOL courses (Statistics, Computer Science and Engineering, Biochemistry, the College of Veterinary Medicine) have been contacted. The CVM was the only entity to respond (see attached e-mail), but none of the others have objected to including their courses in this minor.
Texas A&M University  
Proposed Minor Field of Study

Name of Minor Program: Bioinformatics  
Department: Biology  
College: Science  

Will grant a minor: Yes ☑  No  
Academic Year: 2017

A selection from among the following courses will constitute a minor field of study.

A. The following 10 hours of course work are required.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 110</td>
<td>Introduction to computation</td>
<td>4 cr</td>
</tr>
<tr>
<td>CSCE 111</td>
<td></td>
<td>4 cr</td>
</tr>
<tr>
<td>BIOL 451</td>
<td>Bioinformatic fundamentals</td>
<td>3 cr</td>
</tr>
<tr>
<td>BIOL 350</td>
<td>BIOL 470 beginning Fall 2016</td>
<td>3 cr</td>
</tr>
</tbody>
</table>

B. Select 6-7 hours from the following courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 213</td>
<td>Biological molecules and</td>
<td>3 cr</td>
</tr>
<tr>
<td></td>
<td>processes</td>
<td></td>
</tr>
<tr>
<td>BIOL 450</td>
<td>Applied bioinformatics</td>
<td>4 cr</td>
</tr>
<tr>
<td>BIOL 350</td>
<td>BIOL 470 beginning Fall 2016</td>
<td>3 cr</td>
</tr>
<tr>
<td>STAT 446</td>
<td></td>
<td>3 cr</td>
</tr>
<tr>
<td>VTPP 438</td>
<td></td>
<td>3 cr</td>
</tr>
</tbody>
</table>

Please indicate further requirements such as grade point requirement, prerequisites, resident (if above the minimum 6 hours at the 300- to 400-level), capstone or methods courses.

Minimum of 15 hours required.

Minimum of 6 hours at 300- to 400-level

Students must complete at least 1 course in each of the five categories. If a course in statistics is not already required for student's major then STAT 211, 301, 302, or 303 is strongly recommended. Independent research experiences through 491 courses is encouraged.

Reviewed and approved by:  

[Signature]  
Date: 3/2/16  
AOC Dean of College  
Date: 3/7/16
Minor in Bioinformatics
In the early 21st century we have gained the ability to decipher and manipulate the genetic instructions of living organisms. We have also seen dramatic advances in imaging technologies from the macro to nano scales (Satellites/UAVs, hyper-spectral imaging, GPS, MRI, confocal and two-photon microscopy, x-ray crystallography, etc.). Concomitant with, and underlying these advances, has been a revolution in information technology in which we have seen ever-accelerating computational processing speeds and ever more massive data sets. These changes are driving a fundamental transformation of the biological sciences.

In order to provide our students with the educational foundation they need to not just flourish, but to lead in this dramatically altered environment, we are instituting a new minor in the area of Bioinformatics, to provide effective training at the interface of biological applications and computational tools. While students will be trained using the most advanced instruments, tools and applications available, the minor will focus on core concepts and approaches, to provide a durable skill set that can be applied to new tools and applications that will inevitably arise at an accelerating rate. The core curriculum of the minor will cover the essentials of effective computation, as well as the handling, exploration and utilization of large data sets.

Core curriculum (16-17 cr total): A student must complete at least one course in each of 5 categories. In addition, while not required, independent research is strongly encouraged.

Introduction to computation (4 cr)
Choose one of the following courses:
CSCE 110, Programming I (4 cr)
CSCE 111, Introduction to Computer Science Concepts and Programming (4 cr)

Biological molecules and processes (3 cr)
Choose one of the following courses:
BIOL 213, Molecular and Cell Biology (3 cr)
GENE 302, Principles of Genetics (3 cr)
GENE/BIMS 320, Biomedical Genetics (3 cr)

Bioinformatics fundamentals (3 cr)
BIOL 451, Bioinformatics

Computational bioinformatics (3 cr)
BIOL 350 (BIOL 470/670 in fall 2016), Computational biology (3 cr)

Applied bioinformatics (3-4 cr)
Choose one of the following:
BIOL 450, Genomics (4 cr)
BICH 464, Bacteriophage Genomics (3 cr)
BICH/GENE 419 Computational Techniques for Evolutionary Analysis
VTPP 438, Analysis of Genomic Signals (3 cr)
DIOL 430, Biological Imaging (4 cr)
STAT 446, Statistical Bioinformatics (3 cr)

Independent research
Independent experiences that are tailored to student interests and administered through 491 Research courses offered in multiple departments/programs are strongly encouraged

NOTE: If a course in statistics is not already required for the student’s major then STAT 211, 301, 302, or 303 is strongly recommended.
Dear Kathy, I apologize for my delay in responding. I have been traveling.

I understand that Dr. David Threadgill is in contact with Dr. McKnight about a broader joint effort with BIMS. I think it would be fine to include BIMS courses in your minor, but I hope we can develop a certificate jointly.

Yours truly,

Evelyn Tiffany-Castiglioni, Ph.D.
Professor and Head
Department of Veterinary Integrative Biosciences
Associate Dean for Undergraduate Education
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ecastiglioni@cvm.tamu.edu

From: Kathryn Ryan [mailto:kryan@bio.tamu.edu]  
Sent: Thursday, February 04, 2016 12:48 PM  
To: Castiglioni, Evelyn <ECASTIGLIONI@cvm.tamu.edu>  
Subject: including courses in new minor

Dr. Tiffany-Castiglioni,

The Department of Biology has developed a plan for offering a minor in Bioinformatics. In recognizing the multidisciplinary nature of bioinformatics and trying to provide greatest
flexibility to students, we feel that some courses your department currently offers would be appropriate options for students. We have also structured the minor so that newly developed courses can easily be incorporated. Please review the attached plan and let us know if we may include your courses in our plan or if we should remove them. A response by Feb. 12 would be appreciated.

Thank you
Kathy

Kathryn J. Ryan, Ph.D.
Chair Undergraduate Programs Committee
Department of Biology
Texas A&M University

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