

From: noreply@wsu.edu
To: [curriculum.submit](#)
Subject: 080 466982 Biological Sciences Requirements Revise - Revise or Drop Graduate Certificate
Date: Friday, September 21, 2018 9:26:49 AM
Attachments: [2018.09.21.09.26.33.67.FormData.html](#)
[2018.09.21.09.26.32.61.currentCatalogFile_Bioinformatics_Revised_Requirements.docx](#)
[2018.09.21.09.26.32.61.currentCatalogFile1_Bioinformatics_Rationale.docx](#)

Robert Fris has submitted a request for a major curricular change. His/her email address is: brandon.fris@wsu.edu.

Requested change: Revise or Drop Graduate Certificate

Title: Graduate Certificate in Bioinformatics

Requested Effective Date: Fall 2019

Revise certificate requirement: Yes

Dean: Swindell, Samantha - CAS,

Chair: Carter, Pat,

CSC Notes: **Replace HORT 503 with HORT 550**

Catalog Subcommittee
Approval Date

AAC, PHSC, or GSC
Approval Date

Faculty Senate
Approval Date

From: Carter, Patrick Andrew
To: curriculum.submit; Swindell, Samantha
Subject: RE: 080 466982 Biological Sciences Requirements Revise - Revise or Drop Graduate Certificate
Date: Monday, September 24, 2018 7:35:27 AM

1. I approve this proposal in its current form.

Pat

Patrick A. Carter
Professor and Director
School of Biological Sciences
Washington State University
Pullman, WA 99164-4236

email: pacarter@wsu.edu
phone: 509/335-1447
FAX: 509/335-3184
webpage: <http://www.wsu.edu/~pacarter/>

From: curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>
Sent: Friday, September 21, 2018 9:27 AM
To: Carter, Patrick Andrew <pacarter@wsu.edu>; Swindell, Samantha <sswindell@wsu.edu>
Subject: 466982 Biological Sciences Requirements Revise - Revise or Drop Graduate Certificate

Carter, Pat,

Swindell, Samantha - CAS,

Robert Fris has submitted a request for a major curricular change.

Requested change: Revise or Drop Graduate Certificate

Title: Graduate Certificate in Bioinformatics

Requested Effective Date: Fall 2019

Revise certificate requirement: Yes

Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. (curriculum.submit@wsu.edu.) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.

From: [Swindell, Samantha](#)
To: [curriculum.submit](#); [Carter, Patrick Andrew](#)
Subject: RE: 080 466982 Biological Sciences Requirements Revise - Revise or Drop Graduate Certificate
Date: Wednesday, September 26, 2018 9:47:16 AM

I approve this proposal in its current form

From: curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>
Sent: Friday, September 21, 2018 9:27 AM
To: Carter, Patrick Andrew <pacarter@wsu.edu>; Swindell, Samantha <sswindell@wsu.edu>
Subject: 466982 Biological Sciences Requirements Revise - Revise or Drop Graduate Certificate

Carter, Pat,

Swindell, Samantha - CAS,

Robert Fris has submitted a request for a major curricular change.

Requested change: Revise or Drop Graduate Certificate

Title: Graduate Certificate in Bioinformatics

Requested Effective Date: Fall 2019

Revise certificate requirement: Yes

Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. (curriculum.submit@wsu.edu.) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.
2. I approve this proposal with revisions. Revisions are attached.
3. I do not approve this proposal. Please return to submitter.

If you do not respond within one week, you will be sent a reminder email. If no response is received within three weeks of the submission date, the proposal will be returned to the submitter.

Thank you for your assistance as we embark on this new process. If you have any questions or concerns, please let us know wsu.curriculum@wsu.edu.

Rationale: Graduate Certificate in Bioinformatics – Revise Certificate Requirements

The current requirement of “HORT 503 Advanced Topics in Horticulture – only open when the topic is “Bioinformatics for Research” is no longer appropriate as that course now has its own singular title and number: “HORT 550 Bioinformatics for Research”. This will have no additional impact to any college or school.

Graduate Certificate in Bioinformatics - Course Requirements

Students must be simultaneously enrolled in a graduate-degree granting program at Washington State University as either full-time or part-time students, or in the case of post-graduate professional, receive permission from the certificate administrators.

- A total of twelve credits are required for the graduate certificate.
- Three credits are mandatory and the final nine credits will be chosen from a list of electives depending on the background of the student and the cohesion with the research program.
- All courses must be approved by the Bioinformatics Certificate committee, prior to acceptance in the certificate program, and will also need the approval from the students' Masters or PhD committee (on the plan of study).
- Students must achieve a GPA of 3.0 (B) or better in each certificate course. Note, some courses require permission of the instructor and prerequisites; it is the responsibility of each student to meet the specific requirements for each course.
- Students must take 2 courses outside of their home department (cross-listed courses fulfill this requirement).

Courses

Mandatory Course (3 credits):

- MBIOS 578 Bioinformatics Computer analysis of protein and nucleic acid sequences, functional genomics and proteomics data; modeling biological networks and pathways. Recommended preparation: Introductory genetics or biochemistry coursework

Elective Courses (9 credits):

Biology:

- BIOLOGY 519 Introduction to Population Genetics Survey of basic population and quantitative genetics
- BIOLOGY 521 Quantitative Genetics Fundamentals of quantitative genetics; evolutionary quantitative genetics
- BIOLOGY 534 Modern Methods in Population Genomics Problems and prospects of designing a study with genomic data: from raw data to demography and selection inferences.
- BIOLOGY 576 Epigenetics and Systems Biology. Current literature based course on epigenetics and systems biology with topics in environmental epigenetics, disease etiology, and role epigenetics in evolutionary biology.
- BIOLOGY 566 Mathematical Genetics See MATH 563.

Computer science:

- CPT S 570 Machine Learning Introduction to building computer systems that learn from their experience; classification and regression problems; unsupervised and reinforcement learning.
- CPT S 571 Computational Genomics Fundamental algorithms, techniques and applications.

- CPT S 572 Numerical Methods in Computational Biology Prereq cell biology, probability and statistics, graduate standing in computer science, or permission of the instructor. Computational methods for solving scientific problems related to information processing in biological systems at the molecular and cellular levels.

Crop and Soil Sciences:

- CROP SCI 545 Statistical Genomics Concepts and applications in modern breeding programs.
- CROP SCI 555 Epigenetics in Plants Understanding principles of epigenetics in plants with a focus on its role in understanding and improving plant genomes and their adaptation to the changing environment. Recommended preparation: General genetics.

Horticulture:

- ~~HORT 503 Advanced Topics in Horticulture Only open when the topic is "Bioinformatics for Research"~~
- **Hort 550 Bioinformatics for Research**

Mathematics:

- MATH 563 Mathematical Genetics Mathematical approaches to population genetics and genome analysis; theories and statistical analyses of genetic parameters. (Crosslisted course offered as MATH 563, BIOLOGY 566).

Molecular Biosciences:

- MBIOS 503 Advanced Molecular Biology I DNA replication and recombination in prokaryotes and eukaryotes; recombinant DNA methods and host/vector systems; genome analysis; transgenic organisms. Recommended preparation: Introductory genetics and biochemistry coursework.

Statistics:

- STAT 523 Statistical Methods for Engineers and Scientists Hypothesis testing; linear, multilinear, and nonlinear regression; analysis of variance for designed experiments; quality control; statistical computing.
- STAT 530 Applied Linear Models The design and analysis of experiments by linear models.
- MATH/STAT 536 Statistical Computing Generation of random variables, Monte Carlo simulation, bootstrap and jackknife methods, EM algorithm, Markov chain Monte Carlo methods.
- STAT 565 Analyzing Microarray and Other Genomic Data Statistical issues from pre-processing (transforming, normalizing) and analyzing genomic data (differential expression, pattern discovery and predictions).