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MTVCOMP/Codeset	
Master Curriculum	
CIP Code	
Program Code	
Program Description	

University of Hawai'i
Code Request Form for Academic Programs for

NEW OR MODIFY PROGRAM CODE

Reset Form

☑ **New Program Code** ☐ **Modify Program Code** Date: 11/5/15

REQUESTOR CONTACT INFORMATION

Name: Shelby Wong
Campus: UH Hilo
Title: Curriculum & Catalog Coord
Email: shelbyw@hawaii.edu
Office/Dept: OVCAA
Phone: (808) 932-7927

NEW PROGRAM CODE TO CREATE

Institution: HIL - UH Hilo
Campus: HIL - UH Hilo
Level: UG - Undergraduate
Effective Term: Fall 2015

	Code (Max. Characters)		Description	Check if requesting new code:
College	(2)	AR	Arts and Sciences	☐ See Banner form STVCOLL
Department	(4)	NATS	Natural Science	☐ See Banner form STVDEPT
Degree/Certificate	(6)	BA	Bachelor of Arts	☐ See Banner form STVDEGC
Major	(4)	NSCI	Natural Sciences	☐ See Banner form STVMAJR
Concentration	(4)	CHEM	Chemistry	☑ See Banner form STVMAJR
Minor	(4)			☐ See Banner form STVMAJR

If a similar major/concentration code exists in Banner, please list the code: CHEM

Justification to warrant a new major/concentration code similar to an existing major/concentration code:

Is this major/concentration code being used the same way at the other UH campuses? ☑ Yes ☐ No

Should this program be available for applicants to select as their planned course of study on the online application? *If yes, student may select the code as their only program of study.* ☑ Yes ☐ No

RULES PERTAINING TO FINANCIAL AID AND 150% DIRECT SUBSIDIZED LOAN LIMIT LEGISLATION

Is 50% or greater of the classes in this program offered at a location other than the Home Campus? ☐ Yes ☑ No

Is this program/major/certificate financial aid eligible? ☑ Yes ☐ No

Does this certificate qualify as a Gainful Employment Program (Title IV-eligible certificate program)? ☐ Yes ☐ No
See http://www.ifap.ed.gov/GainfulEmploymentInfo/index.html

Program Length
In academic years; decimals are acceptable. The length of the program should match what is published by the campus in any online and/or written publication. 4 years

Special Program Designations
See Special Program Designations Code Definitions on IRAO Program Code Request webpage
☐ A ☐ B ☑ N ☐ P ☐ T ☐ U

Required Terms of Enrollment: ☑ Fall ☑ Spring ☐ Summer ☐ Extended

University of Hawai'i
Code Request Form for Academic Programs

NEW OR MODIFY PROGRAM CODE

ADDITIONAL COMMENTS

New Concentration Code under Approved Major Code.

ATTACHMENTS

BOR Approved: Associate, Bachelor and Graduate Degrees, and sole credential certificates

☐ BOR Meeting Minutes & Supporting Documents ☐ Curriculum

Chancellor Approved: Certificates related to authorized BOR program & Associate in Technical Studies (ATS) Degree

☐ Memo from Chancellor to notify VPAA about new program ☐ Curriculum

For new certificates approved by the Chancellor, the related BOR authorized academic program is:

VERIFICATIONS

By signing below, I verify that I have reviewed and confirm the above information that is pertinent to my position.

Registrar:

Chelsea Kay-Wong		11/06/15
Print Name	Signature	Date

Financial Aid Officer:

Sherrie Padilla		11/6/15
Print Name	Signature	Date

For Community Colleges, verification of consultation with OVPCC Academic Affairs:

Print Name	Signature	Date

Office of the Vice Chancellor for Academic Affairs

UNIVERSITY of HAWAI'I® HILO

November 10, 2015

MEMORANDUM

TO: Donald Straney, Chancellor
University of Hawai`i at Hilo

FROM: Matthew Platz
Vice Chancellor for Academic Affairs
University of Hawai`i at Hilo

SUBJECT: Request for Approval of Program Concentration Codes for:
BA- Natural Sciences
BA- Kinesiology and Exercise Science

SPECIFIC ACTION REQUESTED:

We request that the following program concentration codes be approved for use for the below degree programs. All concentrations are approved tracks within the degree programs.

BA-NSCI Natural Sciences Requested Concentration Codes:
- BIOL: Biology
- CHEM: Chemistry
- ESSC: Earth Sciences
- PHYS: Physics

BA- KES Kinesiology and Exercise Science Requested Concentration Code:
- KESM: Sports Medicine and Therapy

RECOMMENDED EFFECTIVE DATE:

We request the effective date of Fall 2015 for all concentration codes.

ADDITIONAL COST:

There is no additional cost associated with this request

200 W. Kāwili St.
Hilo, Hawai'i 96720-4091
Telephone: (808) 932-7332
Fax: (808) 932-7338
hilo.hawaii.edu/uhh/vcaa

PURPOSE:

The purpose is to appropriately reflect the approved degree tracks in Banner and affiliate systems so that students may be classified correctly upon completion of the degree program.

ACTION RECOMMENDED:

We recommend that you approve the new program concentration codes for use for in the BA- Natural Sciences (BIOL, CHEM, ESSC, PHYS) and the BA- Kinesiology and Exercise Science (KESM) degree programs.

APPROVED/DISAPPROVED:

Donald Straney

Donald Straney, Chancellor

13 Nov 15

Date

Cc: Risa Dickson, UH System Vice President for Academic Affairs
Zachary Street, Interim Director of Admissions
Chelsea Kay-Wong, Interim Registrar

Program Detail: BA in Natural Science CAS-NS-GEOL -

Approval History | Approver Comments | Approval Status | Action Log

Approval History

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10/15/2014 - JIPPOLIT

(Vote for: 0; Vote against: 0; Vote abstain: 0)

10/17/2014 - JIPPOLIT

(Vote for: 0; Vote against: 0; Vote abstain: 0)

10/28/2014 - JENE

(Vote for: 0; Vote against: 0; Vote abstain: 0)

10/28/2014 - JENE

(Vote for: 0; Vote against: 0; Vote abstain: 0)

10/30/2014 - EKHO

approved (Vote for: 1; Vote against: 0; Vote abstain: 0)

11/12/2014 - LAUER3

The CAS CRC found that the only controversial part of this proposal was the new capstone class, which will require lecturer funds and be taught once per year. The committee recognized the general shortage of lecturer funds in the college and that the Natural Science major has recently been graduating fewer than 10 students per year, but judged the program modifications to be a significant improvement that advances the goal of training more STEM teachers for Hawaii, which justifies the inclusion of one potential low enrollment course. The committee considered the possibility that the new CBES 642/BIOL 442 course could meet many of the goals of the proposed NSCI course but concluded that they were different enough to justify distinct courses. (Vote for: 4; Vote against: 0; Vote abstain: 0)

11/16/2014 - SUSANB

(Vote for: 0; Vote against: 0; Vote abstain: 0)

12/15/2014 - NFURUMO

(Vote for: 6; Vote against: 0; Vote abstain: 0)

12/18/2014 - MPLATZ

(Vote for: 0; Vote against: 0; Vote abstain: 0)

Approval Comments

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Reviewer comments (0)

Approval comments (0)

Review within approval comments (0)

Approval Status

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Completed approvals

Search:

Sequence	Approver	Title	Position	Date	Role	Approved	Progress
No data available in table							

Showing 0 to 0 of 0 entries

Pending approvals

Search:

Sequence	Approver	Title	Position	Delegate
3	EKHO	ASSOCIATE PROFESSOR AND CHAIR, CHEMISTRY	DIVISION CHAIR, NATURAL SCIENCES	
4	LAUER3	ASST PROF	CHAIR CAS CURRICULUM REVIEW COM.	
7	MPLATZ	VCAA	VCAA	
6	NFURUMO	PROFESSOR	CHAIR, FAC CONGRESS CURRICULUM REVIEW COM.	
1	SHELBYW	CURRICULUM COORDINATOR	CURRICULUM COORDINATOR FOR ACADEMIC AFFAIRS	CKWONG
2	SLUNDBLA	PROFESSOR	DEPARTMENT CHAIR, GEOLOGY	
5	SUSANB	PROFESSOR	ASSOC DEAN CAS	

Showing 1 to 7 of 7 entries

Action Log back to top

Show 10 entries Search:

User	script	Action	Date
No data available in table			

Showing 0 to 0 of 0 entries

First Previous Next Last

UH Hilo

Degree:	Bachelor of Arts
Division:	Geology
Title:	BA in Natural Science
Description:	The following description is for the modified program: The interdisciplinary Natural Science program prepares students for careers that require a broad background in science fundamentals. The degree was designed for students that wish to teach science at the intermediate level or in rural high schools. The program also provides training for students with broad interests who intend to pursue non-teaching careers in interdisciplinary arenas. Students in the Natural Science program take foundational courses in biology, chemistry, physics, and earth science. They then take additional advanced courses in one of these disciplines. This gives students an area of specialization. The curriculum is aligned with the competency requirements of the National Science Teachers Association. Graduates of the Natural Science program meet the subject matter entrance requirements of the UH-Hilo Master of Education program, which leads to licensure as a secondary science teacher. Goals for Student Learning: The primary educational objective of the Natural Science program is the development of a solid foundation in the concepts, goals, methods, and societal relevance of the basic sciences, and advanced competency in either biology, biology chemistry, physics, or earth/space science. Students can expect to deepen their knowledge through hands-on laboratory investigations, to develop observational and experimental skills, and become familiar with safety protocols appropriate to teaching laboratories. Students will develop critical thinking skills and a more detailed understanding of scientific concepts in their area of concentration, and through completion of upper division coursework in science subjects outside of their concentration. Students will be able to communicate their knowledge, orally and in writing, to a variety of audiences.
Effective Date:	Fall 2015

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1. Is this a proposal for

(a) modification of an existing undergraduate or graduate program/degree/major/minor/certificate?

(b) a new certificate or minor or track within an existing baccalaureate or graduate program?

(c) a proposal for an individual liberal studies major equivalent?

(d) a request for Approval To Plan a new graduate or undergraduate degree program (ATP)?

(e) a new graduate degree program or a new baccalaureate degree program?

If (a) or (b), please answer all questions in this proposal form.

If (c), provide student's name, student ID, faculty advisor's name, and title of proposed program in the space below; then answer question 2 only, and attach the proposal and advisor's letter.

If (d), answer only questions 1 and 9 and attach your request for Approval to Plan.

If (e), answer all questions and attach both the signed, approved ATP for your proposed program and the program proposal by clicking the "Attachment" tab at the bottom of the proposal form.

The BOR E5.201 template for new programs and budget template are posted on the VCAA Curriculum Resources page: http://hilo.hawaii.edu/uhh/vcaa/CurriculumResources.php

Consult CurrCtrl campus administrator Jon Awaya awayaj@hawaii.edu for assistance.

(a) modification of existing undergraduate program: BA in Natural Science

2. Please answer the following, for both new programs and modifications, numbering your answers.

1. Specify (a) the number of credits required for the program and (b) the number of elective credits.

2. Specify the minimum required GPA for courses taken for the major, minor or certificate. Unless otherwise stipulated here, the minimum required GPA will be set as 2.0 (C) in Banner.

3. Specify the minimum acceptable grade for each course taken for the major, minor, or certificate. Unless otherwise stipulated here, the minimum acceptable grade will be set as 1.0 (D) in Banner.

1. Credits

For the biology track, 69-72 credits are required for the major. 16 of these double dip with GE requirements, resulting in 12-15 general electives.
For the chemistry focus area, 70-73 credits are required for the major. 16 of these double dip with GE requirements, resulting in 11-14 general electives.

For the earth science track, 74-77 credits are required for the major. 22 of these double dip with GE requirements, resulting in 13-16 general electives.
For the physics track, 73 credits are required for the major. 16 of these double dip with GE requirements, resulting in 11 general electives.

2. GPA
Minimum GPA of 2.0 for courses taken for the major.

3. Minimum grade
A "D" is the minimum acceptable grade for courses taken for the major.

3. **How does the NEW program or program modification benefit students, the curriculum, and the institution, and how does this change relate to or impact other programs at the university?**

The primary benefit of the modified program is to train prospective secondary science teachers that are needed for Hawaii's schools, particularly the rural and intermediate schools. By aligning with the entrance requirements of the UH-Hilo School of Education Master of Education program, we anticipate being able to recruit prospective teachers from local high schools. At the current time there is not a unified recruitment effort feeding science majors into the UH-Hilo Master of Education program.

The Natural Science program (NSP) is being modified to align with the new Content Standard Requirements of the National Science Teachers Association (NSTA). Graduates of the Natural Science program will meet the subject matter entrance requirements of the UH-Hilo Master of Education program, which leads to licensure as a secondary science teacher.

A valid question is whether prospective science teachers should pursue a single discipline (biology degree) instead of an interdisciplinary degree. It is true that urban high schools often prefer teachers with teachers with degrees in the field they are teaching. However in rural schools teachers are often assigned classes in a variety of disciplines. The broad nature of the NSP is appropriate preparation for such teachers, and also for those teaching at the intermediate level, where science is typically taught in an interdisciplinary fashion. We noticed some disconnects between the NSTA standards and the curriculum of the single discipline science majors (biology, chemistry, geology, physics), which stress the knowledge needed by working scientists, not the knowledge needed by high school teachers. We have endeavored to remedy these gaps in the curriculum of the NSP.

In redesigning the curriculum, we made three major improvements that will benefit the students and the institution :

1. Adding a capstone course that replaces the previous inadequate capstone seminar. The new capstone develops skills in communicating science to a variety of general audiences, focusing on adults but including children and teens. Further, having a real capstone ensures that we will be able to conduct program assessment properly. (We have learned that it is not possible to do program assessment unless all the seniors can be gathered together in one class that has writing assignments.)

2. The number of upper division science courses has been increased, in order to better develop critical thinking skills.

3. Charting a path to graduation will be simpler for the students. This is because the existing program has three tracks plus a minor. There are ten possible minors, and each has a different number of credits, amount of double dipping, and number of upper division credits. Some minors had hidden requirements (as prerequisites). Under the revised program it clear how many credits must be taken to fulfill major requirements. Also, there is improved clarity about the number of upper division electives that must be taken (above and beyond those taken in fulfillment of the major.)

4. **Describe any additional library resources, facilities, equiipment or other resources required for the new or modified program and provide an estimate of such costs.**

Type in "None" if appropriate.

None

5. **Describe any additional faculty required for the new or modified program and provide an estimate of such costs.**

Addition of a capstone course will require lecturer funds at the rate of one three-credit course per year. While STEM faculty will teach the capstone, a lecturer will be needed to relieve them from their normal teaching duties.

Note: When the original chair of the program (Marlene Hapai) retired, her position was not refilled. Ever since this interdisciplinary program has operated on a budget of zero. Faculty in the geology department have been willing to administer the program because they believe that training future science teachers is important. The geology department is not in a position, however, to reduce geology offerings to teach the Natural Science capstone, which is needed in order to do meaningful program assessment. The administration must decide if this major is worth the cost of paying a lecturer to teach one course per year.

6. **If this is a new program or a new certificate or a minor or a new track within an existing program, copy and paste from a Word document into the window below a catalog-ready list of the graduation (or minor or certificate) requirements, including required courses and acceptable electives.**

If this is a program modification, copy and paste the current requirements into the window below; strike out portions to be deleted, and underline any new or additional portions.
Reminder: This proposal is for one type of program. Include requirements for only one type of program: the BA, or the minor, or the certificate, as indicated by the type of program you selected when you created this

proposal.

Existing (OLD) program

~~Core Requirements~~
~~CHEM 124 124L General Chemistry I with Lab (4)~~
~~CHEM 125 General Chemistry II (3)~~
~~MATH 115 Applied Calculus (3) or MATH 205 Calculus I (4)~~
~~PHIL 390 History and Philosophy of Science (3)or PHIL 392 Biology and Philosophy (3)~~
~~ASTR/BIOL/CHEM/GEOL/MATH/PHYS 495A–495B Seminar (2) or MARE 495 Seminar (3) (see Note 4 below)~~

~~Breadth Requirements (Select the General or Physical or Environmental Science Concentration)~~

~~General Science Concentration:~~
~~BIOL 125 Introduction to Cell and Molecular Biology (3) or BIOL 270 Intermediate Cell and Molecular Biology (3)~~
~~BIOL 175–176 Introductory Biology I and II (6)~~
~~BIOL 175L Introductory Biology I Lab (1) or BIOL 176L Introductory Biology II Lab (1)~~
~~PHYS 106 107 College Physics I and II (6) or PHYS 170 171 General Physics I and II (8)~~
~~PHYS 170L General Physics I Lab (1)~~
~~Three courses selected from the following:~~
~~ASTR 180 Principles of Astronomy I (3)~~
~~ASTR 181 Principles of Astronomy II (3)~~
~~CS 102 Microcomputer Applications for the Sciences (3)~~
~~CS 150 Introduction to Computer Science (3)~~
~~GEOL 111 Physical Geology (3)~~
~~GEOL 112 Historical Geology (3)~~
~~MARE 201 Oceanography (3)~~
~~PHYS/GEOG 120 Weather and Climate of HawaiÊ»i (3)~~
~~One additional laboratory course selected from the following:~~
~~ASTR 110L General Astronomy Lab~~
~~BIOL 175L Introductory Biology I Lab~~
~~BIOL 176L Introductory Biology II Lab~~
~~BIOL 270L Intermediate Cell and Molecular Biology Lab~~
~~CHEM 125L General Chemistry II Lab~~
~~GEOL 111L Physical Geology Lab~~
~~PHYS 171L General Physics II Lab~~
~~Physical Science Concentration:~~
~~BIOL 101 General Biology (3) or BIOL 125 (3) or BIOL 175 (3) or BIOL 176 (3)~~
~~ASTR 180 Principles of Astronomy I (3)~~
~~GEOL 111 Physical Geology (3)~~
~~CHEM 125L General Chemistry II Lab (1)~~
~~PHYS 106–107 College Physics I and II (6) or PHYS 170–171 General Physics I and II (8)~~
~~PHYS 170L General Physics I Lab (1)~~
~~PHYS 171L General Physics II Lab (1)~~
~~Three courses selected from:~~
~~ASTR 181 Principles of Astronomy II (3)~~
~~CS 102 Microcomputer Applications for the Sciences (3)~~
~~CS 150 Introduction to Computer Science (3)~~
~~GEOL 112 Historical Geology (3)~~
~~MARE 201 Oceanography (3)~~
~~PHYS/GEOG 120 Weather and Climate of HawaiÊ»i (3)~~
~~Environmental Science Concentration:~~
~~BIOL 175–175L Introductory Biology I (4) or BIOL 176–176L Introductory Biology II (4)~~
~~BIOL 281 General Ecology (3)~~
~~MARE 282 Global Change (3)~~
~~MATH 121 Introduction to Statistics and Probability (3)~~
~~GEOL 300 Advanced Environmental Earth Science (3)~~
~~CHEM 360 Environmental Chemistry (3) or GEOL 445 GIS for Geology (3)~~
~~Two courses selected from the following. These two courses must be in different disciplines (alphas) (6):~~
~~GEOL 111 Understanding the Earth (3)~~
~~BIOL 156 Natural History and Conservation of the Hawaiian Islands (3)~~
~~BIOL 275 Fundamentals of Microbiology (3)~~
~~CS 102 Microcomputer Applications for the Sciences (3)~~
~~PHYS 106 College Physics I (3)~~
~~PHYS/GEOG 120 Weather and Climate of HawaiÊ»i (3)~~
~~GEOL 360 Surface Water (3)~~
~~GEOL 450 Geological Remote Sensing (3)~~
~~GEOG 300 Climatology (3)~~
~~GEOG/BIOL 309 Biogeography (3)~~
~~GEOG 470 Remote Sensing and Air Photo Interpretation (3)~~
~~MARE 201 Oceanography (3)~~
~~SOIL 304 Tropical Soils (3)~~
~~Two additional laboratory courses selected from the following (2):~~

~~BIOL 175L Introductory Biology I Lab (1)~~
~~BIOL 176L Introductory Biology II Lab (1)~~
~~BIOL 156L Natural History and Conservation of the Hawaiian Islands Lab (1)~~
~~BIOL 275L Fundamentals of Microbiology Lab (1)~~
~~BIOL 281L General Ecology Lab (1)~~
~~CHEM 125L General Chemistry Lab II (1)~~
~~GEOL 111L Understanding the Earth Lab (1)~~
~~MARE 201L Oceanography Lab (1)~~
~~PHYS 170L General Physics Lab I (1)~~
~~Science Minor (15–26 credits)~~
~~General or Physical Science Concentrations complete a minor in Astronomy, Biology, Chemistry, Computer Science, Earth and Space Science, Geology, Marine Science, Mathematics, or Physics.~~
~~Environmental Science Concentration completes a minor in Biology, Chemistry, Geology, or Marine Science.~~
~~Total in Group 2: 57–71 Semester Credits~~

The proposed modified program has four tracks, which are listed in series

Biology Track

Group I: General Education

Group II: Science Foundation
BIOL 175-175L Introductory Biology I with Lab (4)
BIOL 176-176L Introductory Biology II with Lab (4)
CHEM 124-124L General Chemistry I with Lab (4)
CHEM 125-125L General Chemistry II with Lab (4)
GEOL 111-111L Understanding the Earth with Lab (4)
GEOL 112-112L History of Earth & Its Life with Lab (4)
BIOL 280 Biostatistics (3)
MATH 115 Applied Calculus (3) OR Math 205 Calculus I (4)
One of the following sequences:
PHYS 170, 170L, 171, 171L General Phys sequence (10)
OR
PHYS 106, 170L, 107, 171L College Phys sequence (8)
NSCI 476 Communicating Science (3)
Total in group II: 41-44 credits

Group III: Biology Focus
BIOL 125 or 270 Cell & Molecular Biol (3)
BIOL 275-275L Fund Microbiology with Lab (4)
BIOL 281 General Ecology (3)
BIOL 357 Evolution (3)
Two courses selected from:
AG 304 Applied Microbiology (3)
AG 375 Introduction to Genetic Analysis (3)
BIOL 371 Biology Of Marine Invertebrates (3)
BIOL 417 Plant Anatomy (3)
BIOL 443 Ecological Animal Physiology (3)
BIOL 445 Behavioral Ecology & Evolution (3)
BIOL 455 Plant Ecology (3)
BIOL 457 Vegetation of the Hawaiian Isl (3)
BIOL 460 Plant Diversity & Evolution (3)
BIOL 467 Ecological Genetics (3)
BIOL 477 Avian Biology (3)
ENTO 304 General Entomology (3)
PPTH 301 Trop Plant Pathology (3)
Total in group III: 19 credits

Group IV: Allied Science Electives
Three additional courses selected from:
Ag 304 Applied Microbiology (3)
Ag 375 Introduction to Genetic Analysis (3)
ANTH 481 Archaeometry (3)
ANTH 484 Stone Tool Analysis (3)
AQUA 425 Water Qual & Aquatic Product (3)
BIOL 467 Ecological Genetics (3)
BIOL 371 Biology Of Marine Invertebrate (3)
BIOL 381 Conservation Biology (3)
BIOL 417 Plant Anatomy (3)
BIOL 443 Ecological Animal Physiology (3)
BIOL 445 Behavioral Ecology & Evolution (3)
BIOL 455 Plant Ecology (3)
BIOL 457 Vegetation of the Hawaiian Isl (3)

BIOL 460 Plant Diversity & Evolution (3)
BIOL 467 Ecological Genetics (3)
BIOL 477 Avian Biology (3)
CHEM 333 Quantitative Analysis with Lab (5)
CHEM 360 Environmental Chemistry (3)
ENSC 301 Global Warming/Climate Change (3)
ENTO 304 General Entomology (3)
GEOG 300 Climatology (3)
GEOL 300 Adv Environmental Earth Sci (3)
GEOL 342 Earth Surface Processes (3)
GEOL 431 Geology of North America (3)
GEOL 432 Plate Tectonics (3)
GEOL 445 GIS for Geology (3)
GEOL 450 Geological Remote Sensing (3)
GEOL 460 Groundwater (3)
GEOL 472 Volcano Seismology & Geodesy (3)
PPTH 301 Trop Plant Pathology (3)
SOIL 304 Tropical Soils (3)

One of the three courses may be selected from the following:
ED 310 Foundations of Education (3)
ED 350 Develpmntl Concpts Of Learng (3)
PHIL 316 Science, Technology & Society (3)
PHIL 329 Environmental Ethics (3)
PHIL 412 Philosophy of Nature (3)

Total in group IV: 9 credits

Total in groups II-IV: 69-72 credits, 21 of which are upper division

General Electives: 12-15 credits

Minimum Number of Upper Division Credits: 24 credits

Total Minimum Semester Credits for Biology Track: 120

Chemistry Track

Group I: General Education

Group II: Science Foundation

BIOL 175-175L Introductory Biology I with Lab (4)
BIOL 176-176L Introductory Biology I with Lab (4)
CHEM 124-124L General Chemistry I with Lab (4)
CHEM 125-125L General Chemistry II with Lab (4)
GEOL 111-111L Understanding the Earth with Lab (4)
GEOL 112-112L History of Earth & Its Life with Lab (4)
MATH 121 Stats & Prob (3)
MATH 115 Applied Calculus (3) OR Math 205 Calculus I (4)
One of the following sequences:
PHYS 170, 170L, 171, 171L General Phys sequence (10)
OR
PHYS 106, 170L, 107, 171L College Phys sequence (8)
NSCI 476 Communicating Science (3)
Total in group II: 43 credits

Group III: Chemistry Focus

CHEM 141 Surv Organ Chem & Biochem
CHEM 360 Environmental Chemistry (3)
CHEM 320 Descriptive Inorganic Chem (3)
CHEM 333 Quantitative Analysis with Lab (5)
ONE course selected from:
BIOL 125 Intro Cell & Molecular Biol (3)
CHEM 241 Organic Chemistry I (3)
ONE course selected from:
AQUA 425 Water Qual & Aquatic Product (3)
CHEM 431-431L Instrumental Analysis with Lab (4)
ENSC 301 Global Warming/Climate Change (3)
Total in group III: 20 credits

Group IV: Allied Science Electives

Three additional courses selected from:
AG 304 Applied Microbiology (3)
AG 375 Introduction to Genetic Analysis (3)

ANTH 481 Archaeometry (3)
ANTH 484 Stone Tool Analysis (3)
AQUA 425 Water Qual & Aquatic Product (3)
BIOL 357 Evolution (3)
BIOL 371 Biology Of Marine Invertebrate
BIOL 417 Plant Anatomy (3)
BIOL 443 Ecological Animal Physiology (3)
BIOL 467 Ecological Genetics (3)
CHEM 431-431L Instrumental Analysis (4)
CHEM 487 Environmental Toxicology (3)
ENSC 301 Global Warming/Climate Change (3)
ENTO 304 General Entomology (3)
GEOG 300 Climatology (3)
GEOL 300 Adv Environmental Earth Sci (3)
GEOL 342 Earth Surface Processes (3)
GEOL 431 Geology of North America (3)
GEOL 432 Plate Tectonics (3)
GEOL 445 GIS for Geology (3)
GEOL 450 Geological Remote Sensing (3)
GEOL 460 Groundwater (3)
GEOL 472 Volcano Seismology & Geodesy (3)
PPTH 301 Trop Plant Pathology (3)
SOIL 304 Tropical Soils (3)

One of the three courses may be selected from the following:

ED 310 Foundations of Education (3)
ED 350 Develpmntl Concpts Of Learng (3)
PHIL 316 Science, Technology & Society (3)
PHIL 329 Environmental Ethics (3)
PHIL 412 Philosophy of Nature (3)

Total in group IV: 9 credits

Total in groups II-IV: 70-73 credits, 20 of which are upper division

General Electives: 11-14 credits

Minimum Number of Upper Division Credits: 24 credits

Total Minimum Semester Credits for Chemistry Track: 120

Earth Science Track

Group I: General Education

Group II: Science Foundation

BIOL 175-175L Introductory Biology I with Lab (4)
BIOL 176-176L Introductory Biology II with Lab (4)
CHEM 124-124L General Chemistry I with Lab (4)
CHEM 125-125L General Chemistry II with Lab (4)
GEOL 111-111L Understanding the Earth with Lab (4)
GEOL 112-112L History of Earth & Its Life with Lab (4)
MATH 121 Stats & Prob (3)
MATH 115 Applied Calculus (3) OR Math 205 Calculus I (4)
One of the following sequences:
PHYS 170, 170L, 171, 171L General Phys sequence (10)
OR
PHYS 106, 170L, 107, 171L College Phys sequence (8)
NSCI 476 Communicating Science (3)

Total in group II: 41-44 credits

Group III: Earth and Space Science Focus

ASTR 110L Gen Astronomy Lab (1)
ASTR 180 Princ of Astron I (3)
ASTR 181 Princ of Astron II (3)
GEOG 300 Climatology (3)
GEOL 205 Geology of the Hawaiian Islands (3)
GEOL 300 Advanced Environmental Geology (3)
MARE 201-201L Oceanography with Lab (5)
One course selected from:
GEOG 319 Natural Hazards/Disasters (3)
GEOL 330 Derformation of the Earth (4)
GEOL 340 Sedimentary Processes (4)
GEOL 342 Earth Surface Processes (3)

GEOL 344 Coastal Geology (3)
GEOL 352/ASTR 352 Comparative Planetology (3)
GEOL 360 Surface Water (3)
GEOL 431 Geology of North America (3)
GEOL 432 Plate Tectonics (3)
GEOL 460 Groundwater (3)
SOIL 304 Tropical Soils (3)

Total in group III: 24 credits

Group IV: Allied Science Electives

Three additional courses selected from:

AG 304 Applied Microbiology (3)
AG 375 Introduction to Genetic Analysis (3)
ANTH 481 Archaeometry (3)
ANTH 484 Stone Tool Analysis (3)
AQUA 425 Water Qual & Aquatic Product (3)
BIOL 357 Evolution (3)
BIOL 467 Ecological Genetics (3)
BIOL 371 Biology Of Marine Invertebrates (3)
BIOL 417 Plant Anatomy (3)
CHEM 333 Quantitative Analysis with Lab (5)
CHEM 360 Environmental Chemistry (3)
ENSC 301 Global Warming/Climate Change (3)
ENTO 304 General Entomology (3)
GEOL 342 Earth Surface Processes (3)
GEOL 431 Geology of North America (3)
GEOL 432 Plate Tectonics (3)
GEOL 445 GIS for Geology (3)
GEOL 450 Geological Remote Sensing (3)
GEOL 460 Groundwater (3)
GEOL 472 Volcano Seismology & Geodesy (3)

One of the three courses may be selected from the following:

ED 310 Foundations of Education (3)
ED 350 Develpmntl Concpts Of Learng (3)
PHIL 316 Science, Technology & Society (3)
PHIL 329 Environmental Ethics (3)
PHIL 412 Philosophy of Nature (3)

Total in group IV: 9 credits

Total in groups II-IV: 74-77 credits, 21 of which are upper division

General Electives: 13-16 credits

Minimum Number of Upper Division Credits: 24 credits

Total Minimum Semester Credits for Earth Science Track: 120

Physics Track

Group I: General Education

Group II: Science Foundation

BIOL 175-175L Introductory Biology I with Lab (4)
BIOL 176-176L Introductory Biology II with Lab (4)
CHEM 124-124L General Chemistry I with Lab (4)
CHEM 125-125L General Chemistry II with Lab (4)
GEOL 111-111L Understanding the Earth with Lab (4)
GEOL 112-112L History of Earth & Its Life with Lab (4)
Math 121 Stats & Prob (3)
MATH 205 Calculus I (4)
PHYS 170-170L General Phys I: Mechanics with Lab (5)
PHYS 171-171L General Phys II: Electricity & Magnetism with Lab (5)
NSCI 476 Communicating Science (3)

Total in group II: 44 credits

Group III: Physics Focus

MATH 206 Calculus II (4)
MATH 231 Calculus III (3)
MATH 300 Ordinary Diff Equations (3)
PHYS 270 Modern Physics (3)

PHYS 371 Classical Mechanics (3)
One course selected from:
PHYS 211 Electronics (4)
PHYS 230 Applied Electonics (4)
One course selected from:
PHYS 330 Electromagnetism (3)
PHYS 331 Optics (3)
PHYS 342 Thermodynamics (3)
PHYS 360 Mathematical Physics (3)
Total in group III: 23 credits

Group IV: Allied Science Electives
Two additional courses selected from:
Ag 304 Applied Microbiology (3)
Ag 375 Introduction to Genetic Analysis (3)
ANTH 481 Archaeometry (3)
ANTH 484 Stone Tool Analysis (3)
AQUA 425 Water Qual & Aquatic Product (3)
BIOL 357 Evolution (3)
BIOL 371 Biology Of Marine Invertebrate
BIOL 417 Plant Anatomy (3)
BIOL 467 Ecological Genetics (3)
CHEM 333 Quantitative Analysis with Lab (5)
CHEM 360 Environmental Chemistry (3)
ENSC 301 Global Warming/Climate Change (3)
ENTO 304 General Entomology (3)
GEOG 300 Climatology (3)
GEOL 300 Adv Environmental Earth Sci (3)
GEOL 342 Earth Surface Processes (3)
GEOL 431 Geology of North America (3)
GEOL 432 Plate Tectonics (3)
GEOL 445 GIS for Geology (3)
GEOL 450 Geological Remote Sensing (3)
GEOL 460 Groundwater (3)
GEOL 472 Volcano Seismology & Geodesy (3)
PHYS 330 Electromagnetism (3)
PHYS 331 Optics (3)
PHYS 342 Thermodynamics (3)
PHYS 360 Mathematical Physics (3)
PPTH 301 Trop Plant Pathology (3)
SOIL 304 Tropical Soils (3)
One of the two courses may be selected from the following:
ED 310 Foundations of Education (3)
ED 350 Develpmntl Concpts Of Learng (3)
PHIL 316 Science, Technology & Society (3)
PHIL 329 Environmental Ethics (3)
PHIL 412 Philosophy of Nature (3)
Total in group IV: 6 credits

Total in groups II-IV: 73 credits, 18 of which are upper division

General Electives: 11 credits

Minimum Number of Upper Division Credits: 21 credits

Total Minimum Semester Credits for Physics Track: 120

7. **List any new courses or modified courses being proposed with this program proposal, providing alpha, number, and title of each one. The proposals for these new/modified courses MUST be submitted at the same time as this program proposal, to ensure proper review by approvers. Specify "Proposal submitted" next to each course in your list.**

   NSCI 476 "Communicating Science" is a new course proposed for the revised program. Proposal submitted

8. **Does this new or modified program involve courses offered by other departments? If not, type in "no." If yes, please attach an email (in PDF) or other document from the chair(s) of the other department(s) approving the inclusion of those courses by alpha, number, and title.**

   To attach, click on the ATTACHMENT button at the bottom of this page, next to the SUBMIT button.

   Due to the interdisciplinary nature of this program, consultation was conducted with the astronomy/physics, biology, chemistry, education, geography, geology, mathematics, and marine science departments, and the CARNRM college. Topics

covered included program objectives, suitability of course content, availability of seats, and how demand for seats would differn between the old and new programs. Constultation was particuarly extensive with the departments in the four focus areas.

Please see the attachment for documentation of the approval of departments to have their courses included.

9. **Please record the department vote approving the proposed change(s): Approve, Not Approve, Abstain; give the date of the vote.**

Approve: 4
Not Approve: 0
Abstain: 0

Vote tallied on September 24, 2014

10. **Provide other attachments that you believe will be useful and informative to reviewers and approvers.**

Brief Description of Program Changes

The old program consisted of a common core, a focus area that provided depth, and a "buffet" that provided breadth. The proposed modified program is essentially the same, except that 1) there have been some adjustments to courses in the common core, 2) the number of focus areas has been reduced, and 3) the "buffet" has been changed from mostly lower division courses to upper division courses. By and large the focus area requirements have become more rigorous.

Specific changes are as follows:

1) Students in the existing program chose one of three tracks (general science, physical science, and environmental science) and one of ten minors. The requirement of a minor is being eliminated. There are now four tracks representing the four focus areas of the NSTA accreditation requirements: biology, chemistry, earth and space science, and physics.

2) Computer science is no longer part of the curriculum (because it is not a true natural science) and marine science has been de-emphasized because the upper division MARE courses do not have empty seats.

3) The number of upper division science courses is being increased, primarily in the form of electives selected from a variety of departments.We have made a special effort to ensure that students that have completed the freshman foundational courses (and in some cases the lower division focus requirements) will have the prerequisites to take the upper division science electives. The electives come from a broad spectrum of disciplines, including physical geography and the agricultural sciences.

4) A WI capstone course has been added to replace the previous inadequate capstone, a statistics course has been added, and the philosophy of science course has been changed from a requirement to an elective.

Note 1: We did not add a writing course such as ENG 225 or ENG 287 to the requirements because of ongoing problems in staffing/funding these courses. This could be revisited if the situation changes.

Note 2: The number of required upper division credits is less than 45. This is because of the large number of credits required in lower division courses. Although the modified program has shifted as much as possible to upper division courses, a broad preparation in the sciences necessitates taking many introductory courses. This is particularly true in the physics track, where students must take extra math that is needed for courses above the freshman level.

More about the NSTA standards

The UH-Hilo School of Education collaborated with us on the program modification, providing and interpreting the new standards of the National Science Teacher Association (NSTA). The Natural Science program is being aligned with the NSTA broad field licensure program in secondary science, which prepares a teacher to teach in three or four disciplines. The NSTA competency requirements form, in part, the accreditation requirements of the UH-Hilo School of Education.

Attachments

History	Version	File Name
	1	Supporting Documents.pdf

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