UMBC UGC Program Changes & Other Request: Human Context of Science and Technology (HCST)

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Specifics (see instructions):

The HCST Committee proposes the following changes to the HCST Certificate requirements. First, the HCST Committee proposes to reduce the total number of required credits from 27 to 21 to align with similar certificate programs at other institutions. Second, the Committee proposes to reduce the electives chosen from the list of prescribed courses from 15 to 9. Third, the Committee proposes to require that the three electives chosen from the list of prescribed courses come from at least two departments to provide for greater breadth in the study of the human context of science and technology. Fourth, we have added courses to the list of electives (PHIL 477, PHIL 478, and also HCST 400 & HCST 499, assuming these last two new courses are approved). Finally, the Committee proposes that the 9 credit Natural Science/Engineering/Math component allow for greater flexibility in how the requirement is fulfilled to allow students the option of breadth rather than depth in a particular field of science, engineering, or math. The amended Natural Science/Engineering/Math component requirement will allow students the option of taking three science, engineering, and/or math courses from different disciplines (allowing for breadth), rather than requiring all three to be in the same discipline.

Current Requirements	Proposed Changes to Requirements
Total Credits: 27	**Total Credits: 21**
The program has a three-part structure:	**The program has a three-part structure:**
1. A required introductory course, HCST 100 (three hours) 2. Electives chosen from a list of prescribed courses (15 hours) 3. Natural science/engineering component (nine hours minimum)	1. A required introductory course, HCST 100 (three hours) 2. Electives chosen from a list of prescribed courses (nine hours) 3. Natural science/engineering/math component (nine hours)
I.) HCST 100 (3 credits) (GFR: meets A/H, GDR: meets H)	**I.) HCST 100 (3 credits) (GFR: meets A/H, GDR: meets H)**
II.) Electives (15 hours)	**II.) Electives (9 hours)**
A student in the HCST Certificate Program would take five of these courses, of which at least four would have to be at the upper level. Substitutions to this list can be approved by the director of the certificate program. This course list will be subject to periodic revision. For all courses, a grade of "C" or better is required.	A student in the HCST Certificate Program would take three of these courses, of which at least two would have to be at the 300 or 400 level. Only two courses from within one discipline (including cross-listed courses) may be counted toward the required three courses. Substitutions to this list can be approved by the director of the certificate program. This course list will be subject to periodic revision. For all courses, a

Electives List:

- AMST 270 - American Culture and Science (3.00)
- AMST 388 - American Environments: Landscape and Culture (3.00)
- ENGL 388 - American Environment: Landscape and Culture
- ANTH 312 - Medical Anthropology (3.00)
- ENGL 200 - Language and Scientific Value (3.00)
- ENGL 317 - Literature and the Sciences (3.00)
- CPLT 317 - Literature and the Sciences
- ENGL 383 - Science Writing (3.00)
- ENGL 418 - Advanced Topics in Literature and the Sciences
- ENGL 419 - Seminar in Literature and the Sciences (3.00)
- GES 326 - American Conservation Thought (3.00)
- GES 432 - Seminar in Natural Resources and Environmental Conservation (3.00)
- HIST 369 - Darwinism: The Evolutionary Perspective (3.00)
- HIST 387 - Medicine and Health Care in China (3.00)
- HIST 404 - History of Computers and Computing
- IS 404 - History of Computers and Computing
- CMSC 404 - The History of Computers and Computing (3.00)
- HIST 492 - Colloquium in the History of Science
- HIST 445 - History of Science to 1700 (3.00)
- HIST 446 - History of Science Since 1700 (3.00)
- MATH 432 - History of Mathematics (3.00)
- PHIL 248 - Introduction to Scientific Reasoning (3.00)
- PHIL 251 - Ethical Issues in Science and Engineering (3.00)
- CMSC 304 - Social and Ethical Issues in Information Technology (3.00)
- PHIL 358 - Bioethics (3.00)
- HAPP 358 - Bioethics (3.00)
- PHIL 372 - Philosophy of Science (3.00)
- PHIL 394 - Philosophy of Biology (3.00)
- PHIL 395 - Philosophy of Physics (3.00)
- PHIL 354 - Ethics, Animals, and the Environment (3.00)
- PHIL 472 - Advanced Topics in the Philosophy

grade of "C" or better is required.

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- HIST 404 - History of Computers and Computing
- IS 404 - History of Computers and Computing
- CMSC 404 - The History of Computers and Computing (3.00)
- HIST 350 – History of Medicine (3.00)
- HIST 492 - Colloquium in the History of Science
- HIST 445 - History of Science to 1700 (3.00)
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of Science (3.00)

- PHYS 333 - Applied Physics in Archaeology and Art (3.00)
- POLI 452 - Politics of Health (3.00)
- SOCY 351 - Medical Sociology (3.00)
- SOCY 352 - Issues in Health Care (3.00)
- SOCY 361 - Science and Society (3.00)
- SOCY 416 - Cyberspace Culture (3.00)
- ANTH 416 - Cyberspace Culture (3.00)
- SOCY 457 - Social History of American Medicine (3.00)
- HIST 450 - Social History of American Medicine (3.00)
- GWST 352 - Women, Gender, and Information Technology (3.00)
- GWST 378 - Women, Gender and Science (3.00)

III.) Natural science/technology/math component (9 hours minimum)

In addition to studying critical literature about science and technology, students must become acquainted in some detail with current conceptions and practice in a chosen area of science or technology as presented by that area's current practitioners. Students may request the Director to consider elective designation for appropriate fields not on this list. A grade of "C" or better is required. The following options are available:

Biology Option:

- BIOL 100 - Concepts of Biology (4.00)
- BIOL 100L - Concepts of Experimental Biology (2.00)
- BIOL 302 - Molecular and General Genetics (4.00)

Chemistry Option:

Select one of the sequences:
- CHEM 123 - Introduction to General Organic and Biochemistry I (4.00)
- CHEM 124 - Introduction to General Organic and Biochemistry II (3.00)
- CHEM 124L - General Organic and Biochemistry Lab (2.00)
- CHEM 101 - Principles of Chemistry I (4.00)

- PHIL 395 - Philosophy of Physics (3.00)
- PHIL 354 - Ethics, Animals, and the Environment (3.00)
- PHIL 472 - Advanced Topics in the Philosophy of Science (3.00)
- **PHIL 477 – Minds, Machines, and Logic (3.00)**
- **PHIL478 – Philosophy and Evolution (3.00)**
- PHYS 333 - Applied Physics in Archaeology and Art (3.00)
- POLI 452 - Politics of Health (3.00)
- SOCY 351 - Medical Sociology (3.00)
- SOCY 352 - Issues in Health Care (3.00)
- SOCY 361 - Science and Society (3.00)
- SOCY 416 - Cyberspace Culture (3.00)
- ANTH 416 - Cyberspace Culture (3.00)
- SOCY 457 - Social History of American Medicine (3.00)
- HIST 450 - Social History of American Medicine (3.00)
- GWST 352/IS 352 - Women, Gender, and Information Technology (3.00)
- GWST 378 - Women, Gender and Science (3.00)
- **HCST 400 – Independent Study in the Human Context of Science and Technology (3.00)**
- **HCST 499 – Advanced Topics in the Human Context of Science and Technology (3.00)**

III.) Natural Science/Technology/Math component (9 hours)

Below are three possible ways to specify the science/technology/math component consistent with what was decided at the December meeting.

In addition to studying critical literature about science and technology, students must become acquainted with science, technology, and/or math by completing 9 credits of Science, Mathematics, or Engineering courses. This includes courses with Science (S) or Math (M) GEP designation or any courses taught in the College of Engineering and Information Technology or College of Natural and Mathematical Sciences. With the approval of the Director, students may include science or technology based courses taught in the College of Arts, Humanities, and Social Sciences to cover the Natural Science/Technology/Math component. Courses used to cover the Natural

- CHEM 102 - Principles of Chemistry II (4.00)
- CHEM 102L - Introductory Chemistry Lab I (2.00)

Computer Science Option:

Three courses chosen from the following:

- CMSC 104 - Problem Solving and Computer Programming (3.00)
- CMSC 201 - Computer Science I for Majors (4.00)
- CMSC 202 - Computer Science II for Majors (4.00)
- CMSC 203 - Discrete Structures (3.00)

Geography and Environmental Systems Option:

- GES 110 - Physical Geography (3.00)
- GES 111 - Principles of Geology (3.00)
- GES 120 - Environmental Science and Conservation (3.00)

Information Systems Option:

- IS 202 - Systems Analysis Methods (3.00)

Two additional courses chosen from

- IS 125 - Information Systems Logic and Structured Design (3.00)
- any IS courses at the 200 level or above

Mathematics/Statistics Options:

- MATH 151 - Calculus and Analytic Geometry I (4.00)
- MATH 152 - Calculus and Analytic Geometry II (4.00)

Select one from the following:

- either any 200-level MATH course
- any 300-level STAT course

Physics Option:

Select one of the sequences:

Science/Technology/Math component may not also be used to cover the Electives component of the HCST Certificate requirements. For all courses, a grade of "C" or better is required.

- PHYS 111 - Basic Physics I (4.00)
- PHYS 112 - Basic Physics II (4.00)
- any other course in the physical sciences

- PHYS 121 - Introductory Physics I (4.00)
- PHYS 122 - Introductory Physics II (4.00)
- PHYS 122L - Introductory Physics Laboratory (3.00)

Chemical and Biochemical Engineering Option:

- ENES 101 - Introduction to Engineering (3.00)
- CHEM 101 - Principles of Chemistry I (4.00)
- CHEM 102 - Principles of Chemistry II (4.00)
- CHEM 102L - Introductory Chemistry Lab I (2.00)
- ENCH 215 - Chemical Engineering Analysis (3.00)

Mechanical Engineering Option:

- ENES 101 - Introduction to Engineering (3.00)
- ENME 204 - Introduction to Engineering Design with CAD (3.00)
- ENME 220 - Mechanics of Materials (3.00)

General Engineering Option:

- ENES 101 - Introduction to Engineering (3.00)

AND

- At least two more three-credit courses in an engineering field, selected from the courses listed under the engineering options. In exceptional cases, courses other than the ones listed may be accepted on the recommendation of the advisor, provided they are at a similar or higher level.

Rationale (see instructions):

Since this program was approved, the field has grown immensely. The changes reflect developments in the field and also better align with the specific needs of UMBC. Reducing the total number of required credit hours from 27 to 21 will bring us into alignment with other comparable certificate programs at other universities. The number of

requirements for comparable certificates at other institutions range from 15 (e.g. University of Wisconsin-Madison and University of Colorado Boulder) to 21 credit hours (e.g. Duke University and University of Maryland, College Park). In addition, the current requirements make it difficult for both science and non-science majors at UMBC to complete the certificate. Reducing the number of electives in the Arts, Humanities, and Social Sciences will make it more feasible for students in STEM fields to complete the HCST Certificate, and allowing for more flexibility in the science requirements will make it easier for those majoring in non-STEM fields to complete the Certificate. Moreover, the HCST Committee believes that students should have a breadth of different approaches to the study of the human context of science and technology coming from different disciplines in the arts, humanities, and social sciences. This is provided to some extent with HCST 100, but is also served by requiring the three electives from the list of prescribed courses to come from at least two different disciplines. The four courses being added to the list of electives are two recently created course from Philosophy that address issues in the human context of science and technology (PHIL 477 – Minds, Machines, and Logic & PHIL478 – Philosophy and Evolution) and two new HCST courses being proposed (HCST 400 – Independent Study in the Human Context of Science and Technology and HCST 499 – Advanced Topics in the Human Context of Science and Technology). Finally, the HCST Committee believes that those studying the human context of science and technology can be equally served by gaining a broader understanding of different areas of science, engineering, and math, rather than focusing in depth in a specific area. Hence, allowing students to take science, math, and/or engineering courses from different disciplines, rather than all from the same discipline, will provide students the opportunity to gain a broader understanding of the similarities and differences between different fields. The Committee believes that depth and breadth are equally valuable intellectually, and the revised Science/Technology/Math Component requirements allow students either to delve more deeply into one discipline or to gain a broader understanding by taking courses in different disciplines.

HCST Philosophy Course additions as electives

Steve Yalowitz <yalowitz@umbc.edu>   Thu, Nov 21, 2019 at 2:36 PM
To: Jessica Pfeifer ~ Work <pfeifer@umbc.edu>

Jessica,

The Philosophy Dept. is happy to support the addition of PHIL 477 and 478 to the list of electives for HCST. Please let me know if you need anything further on this.

Best,
Steve
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