The HMC Core Curriculum Decade-by-Decade

To get a sense of where the HMC core curriculum has been over its 50-year history, this document gives a snapshot of the core at 10-year intervals (starting in 1958-1959), from what is written in the old catalogs of the College. It highlights how our curriculum has evolved with respect to several items discussed the SVCC proposal: core structure, unit requirements, pass/fail policy, foreign languages, and the ability to take electives.

A reference to the curriculum of a particular year, such as 1957 or 1998, means a reference to the catalog which begins that year (e.g., 1957-1958 or 1998-2001).

Please bear in mind that the snapshot at that time reflects what is in the published catalog. (It is possible that core modifications occurred during the time period of the catalog but were not published until the following catalog.) If there are errors, they are due to transcription (though I have made every effort to be accurate), or due to ambiguities in the wording of the catalog.

Also, this document is not an exhaustive history of our curriculum, since snapshots by decade are inevitably going to miss some key developments (a notable example is the Quest for Commonwealth in the early 1970’s). I have tried to transcribe what I found in the catalogs, but have not made a determined effort to try to interpret the continuous history of the curriculum. G. Van Hecke’s history of the HMC curriculum 1957-1993 may be more helpful in giving a more continuous picture.

Consider this document purely informational. It is not meant to constrain our thinking about where our curriculum should be headed.

F. Su
August 2008
1958-1959

Freshman Year Curriculum

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1 (4 units)</td>
<td>Chemistry 2 (4 units)</td>
</tr>
<tr>
<td>Mathematics 1 (3)</td>
<td>Mathematics 2 (3)</td>
</tr>
<tr>
<td>Physics 1 (4)</td>
<td>Physics 2 (4)</td>
</tr>
<tr>
<td>English 1 (3)</td>
<td>English 2 (3)</td>
</tr>
<tr>
<td>Mechanical Drawing 1 (1)</td>
<td>Mechanical Drawing 2 (1)</td>
</tr>
<tr>
<td>15 units core</td>
<td>15 units core</td>
</tr>
</tbody>
</table>

- 120 units required to graduate + physical education (4 semesters in first 2 years)
- All freshman courses are core.
- Sophomore core was a five course load both semesters, comprising:
- Junior and Senior years recommended a five course load:
  - 3 major + 1 humanities + 1 social studies course per term
- Core+HSS: effectively 46+42=88 units

Course content:

Chem 1-2 (reactions, equilibrium, bonding, structure),
Chem 51-52: (physical chemistry, intro thermodynamics, electrochemistry),
English 1-2 (expository writing, analytical reading, argumentation / theme writing),
English 51-52 (English literature),
History 51-52 (Western civilization, history of science),
Math 1-2 (analytic geometry, calculus: differentiation, integration, intro ODEs),
Math 51-52 (infinite series, Taylor series, multivariable calculus),
Mechanical Drawing 1-2 (projection, visualization, working drawings),
Phys 1-2 (mechanics, heat, and sound, with lab),
Phys 51-52 (electricity, light, atomic/nuclear physics, “quantum approach”).

Notes: The 1958-59 catalog was the second catalog produced. Naturally, the curriculum at this time was undergoing quite a bit of evolution. In the 1961-62 catalog, Mechanical Drawing was replaced by Engineering 3-4 (2 units each), English 51-52 and History 51-52 were replaced by one Humanities and one Social Studies course each term. The 120-unit requirement was replaced by a requirement that students “must complete all courses required of him by the faculty”, with 15-17 units per term recommended. In the 1965-66 catalog, Engineering Problems 3 and 4 was replaced by Engineering 5 (Computation and Fortran, 1 unit) and Engineering 6 (Systems Engineering, 3 units) for 14 units, 16 unit totals the first year.
### Freshman Year Curriculum

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1 (4)</td>
<td>Chemistry 2 (4)</td>
</tr>
<tr>
<td>Mathematics 1 (4 units)</td>
<td>Mathematics 2 (4 units)</td>
</tr>
<tr>
<td>Physics 1 (3)</td>
<td>Physics 2 (3)</td>
</tr>
<tr>
<td>Physics 3 (1)</td>
<td>Physics 4 (1)</td>
</tr>
<tr>
<td>Literature 1 (3)</td>
<td>Humanities 2 (3)</td>
</tr>
<tr>
<td>Engineering 5 (1)</td>
<td>Elective (if desired)</td>
</tr>
<tr>
<td><strong>16 units core</strong></td>
<td><strong>15 units core + elective</strong></td>
</tr>
</tbody>
</table>

- Lit 1 and Hum 2 could be interchanged
- Ungraded first year
- Core+HSS:
  - Freshman Core (above) and in addition:
  - Math 51 (3)
  - Physics 51,53 (3+1),
  - Engineering 53 (3)
  - 12 courses HSS
- Total Core+HSS: 77 units
- To graduate students must complete “distributive requirements” and major; hence different numbers of units to graduate for each major
  - Engineering: 57 required units, including E5 and E53 (in core) and Math courses 52, 111, 112, for a total of 77+57-4=130 units.

### Course content:

- Chem 1 (gases, atomic structure, bonding),
- Chem 2 (kinetics, thermodynamics),
- Engin 5 (computation, FORTRAN, numerical methods),
- Lit 1 (composition, reading/writing/reasoning),
- Hum 2 (man, science, society),
- Math 1 (calculus),
- Math 2 (linear analysis: matrices, linear DE’s),
- Math 51 (multivariable calc),
- Math 52 (complex analysis),
- Math 111-112 (applied analysis: Fourier, ODE’s),
- Phys 1-4 (mechanics, relativity, electricity, lab),
- Phys 51 (electromagnetic theory),
- Phys 52 (waves, quantum mechanics),
- Engineering 53 (systems)
**1979-1980**

**Freshman Year Curriculum**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 21 (4)</td>
<td>Chemistry 22 (2)</td>
</tr>
<tr>
<td>Chemistry 25 (1)</td>
<td>Chemistry 26 (½)</td>
</tr>
<tr>
<td>Computing 5 (2)</td>
<td>HSS 2 (4)</td>
</tr>
<tr>
<td>Rhetoric 1 (4)</td>
<td>Freshman Project (2)</td>
</tr>
<tr>
<td>Math 7 (4)</td>
<td>Math 8 (3)</td>
</tr>
<tr>
<td>Physics 23 (2)</td>
<td>Math 10 (1)</td>
</tr>
<tr>
<td>Physics 27 (½)</td>
<td>Physics 24 (3)</td>
</tr>
<tr>
<td></td>
<td>Physics 28 (1)</td>
</tr>
<tr>
<td></td>
<td>Physics 32 (1)</td>
</tr>
</tbody>
</table>

17.5 units core

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- **Freshman Division courses ungraded**
- **Core+HSS:**
  - Freshman Core (above) and in addition:
    - Chem 51 (3)
    - Engineering 53 (3)
    - Math 38, 73 (3+3)
    - Physics 51, 53 (3+1)
    - 11 courses HSS
- **Total Core+HSS: 84 units**
- **128 units to graduate; “some majors may require more”**:
  - Engineering: 49 required units, including E53 (in core) and Math courses 113, 114, for a total of 82+49-3=130 units.

**Course content:**

Chem 21-22, 25-26 (thermo, bonding, equilibrium, kinetics, with lab),
Computing 5 (programming),
English 11 (English composition),
Freshman Project (open-ended problems),
Hum 1 (rhetoric: expository prose, literary analysis),
Hum 2 (various HSS topics),
Math 7 (calculus),
Math 8 (complex numbers, simple DEs, infinite series, approx methods),
Math 10 (prob/stat),
Math 38 (multivariable calc),
Math 73 (linear algebra),
Math 113-114 (ODE’s, PDE’s, Fourier),
Physics 23-24, 27-28 (mechanics, waves, optics, with lab),
Physics 32 (special relativity),
## 1988-1990

### Freshman Year Curriculum

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<tbody>
<tr>
<td>Chemistry 21 (3)</td>
<td>Chemistry 22 (3)</td>
</tr>
<tr>
<td>Chemistry 25 (1)</td>
<td>Chemistry 26 (1)</td>
</tr>
<tr>
<td>CS 5 (2)</td>
<td>HSS 2 (3)</td>
</tr>
<tr>
<td>HSS 1 (4)</td>
<td>Mathematics 4 (3)</td>
</tr>
<tr>
<td>Math 3 (4)</td>
<td>Physics 24 (3)</td>
</tr>
<tr>
<td>Physics 23 (2)</td>
<td>Physics 28 (1)</td>
</tr>
<tr>
<td><strong>16 units core</strong></td>
<td><strong>Core Elective (3)</strong></td>
</tr>
</tbody>
</table>

- Ungraded first semester core
- Core+HSS:
  - Freshman Core (above) and in addition:
  - Engineering 53 (3)
  - Math 73, 82 (3+3)
  - 10 courses HSS (in addition to above)
  - 3 Core Electives, chosen from Bio 52, Chem 51, Chem 56, CS 60, Math 55, Phys 52, any HSS, any Engineering
- Total Core+HSS: 82 units
- 128 units to graduate
  - Engineering: 52 required units, including E53 (in core) and E4 (which can count as core elective) and Math course 115. Because E4 counts as a core elective, the total is 82+52-6=128 units.
1998-2001

Freshman Year Curriculum

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<td>Chemistry 21  (3)</td>
<td>Chemistry 22  (3)</td>
</tr>
<tr>
<td>Chemistry 25  (1)</td>
<td>Chemistry 26  (1)</td>
</tr>
<tr>
<td>CS 5  (3)</td>
<td>HSS 2  (3)</td>
</tr>
<tr>
<td>HSS 1  (4)</td>
<td>Mathematics 4  (3)</td>
</tr>
<tr>
<td>Math 3  (4)</td>
<td>Physics 24  (3)</td>
</tr>
<tr>
<td>Physics 23  (2)</td>
<td>Physics 28  (1)</td>
</tr>
<tr>
<td>17 units core</td>
<td>Bio 52 or Core Elective  (3)</td>
</tr>
</tbody>
</table>

- Ungraded first semester core
- Core+HSS:
  - Freshman Core (above) and in addition:
  - Engineering 53 (3)
  - Math 73, 82 (3+3)
  - Physics 51, 53 (3+1)
  - 10 courses HSS (in addition to above)
  - Bio 52 now a floating requirement
  - 2 Core Electives, chosen from different departments (and majors may require one of them): Chem 51, Chem 56, CS 60, Math 55, Phys 52, any Engineering, any HSS
- Total Core+HSS: 83 units
- 128 units to graduate, except for 129 for Engineering majors
  - Engineering: 52 required units, including E53 (in core) and Math 115, for a total of 83+52-6=129 units.

During the duration of this catalog, there were core revisions that removed the Core Elective, instituted the IE’s, and established a new math core. These changes appear in the next frame (2007-2009).
2007-2009 (current catalog)

Freshman Year Curriculum

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<tr>
<td>Chemistry 21 (3)</td>
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</tr>
<tr>
<td>Chemistry 25 (1)</td>
<td>Chemistry 26 (1)</td>
</tr>
<tr>
<td>CS 5 (3)</td>
<td>HSS Elective (3)</td>
</tr>
<tr>
<td>Hum 1 (4)</td>
<td>Math 13, 14 (3)</td>
</tr>
<tr>
<td>Math 11, 12 (2+2)</td>
<td>Physics 24 (3)</td>
</tr>
<tr>
<td>Physics 23 (2)</td>
<td>Physics 28 (1)</td>
</tr>
<tr>
<td></td>
<td>Elective (3)</td>
</tr>
</tbody>
</table>

- 17 units core
- 14 units core + elective

- Ungraded first semester core
- Core+HSS:
  - Freshman Core (above) and in addition:
  - Bio 52 (3)
  - Engineering 59 (3)
  - Math 61, 62, 63, 64 (1.5+1.5+1.5+1.5)
  - Phys 51, 53 (3+1)
  - 10 courses HSS (in addition to above)
  - Integrative Experience (3)
- Total Core+HSS: 50+30=80 units
- 128 units to graduate
  - Engineering: 48 required units including E59 (in core), for a total of 125 required units, and 3 units of electives.
Foreign Language Requirements at HMC

- **1958:**
  o 2 years of foreign language required for admission.
  o In the 1959-60 catalog (only): 2 semesters of German (G) is prescribed in junior year for all majors except engineers.

- **1965:**
  o 2 years of language were required for admission
  o All majors except engineering had a language requirement:
    ▪ Chemistry majors: must demonstrate reading knowledge of G
    ▪ Math majors: must take a year of GFR (German, French, Russian) or “demonstrate proficiency”
    ▪ Physics majors: must demonstrate proficiency in GFR
  o German 101, 102 offered at the college (102 may count as Hum elective)

- **1969:**
  o 2 years of foreign language were required for admission
  o No majors required language, no language courses offered at HMC
    ▪ Chemistry majors: Reading knowledge of G recommended
    ▪ Math majors: Reading knowledge of GFR recommended
    ▪ Physics majors going to grad school “should demonstrate proficiency” in GFR

- **1979:**
  o 2 years of foreign language “recommended” for admission
  o majors: similar to 1969, except chemistry now says GFR “but preferably German” recommended for majors

- **1989:**
  o 2 years of foreign language recommended for admission
  o only chemistry recommends language (GFR, preferably G) for majors

- **2008:**
  o 2 years of foreign language recommended
  o no majors recommend foreign languages in the catalog
Mathematics Requirements in the Core and Majors
Decade-by-decade

1959:
Math Core was 12 units:
- Math 1-2 (calculus, complex numbers)
- Math 51-52 (multivariable calculus, determinants)
Some majors required 6 more units:
- Engineering and Physics required Math 111-112 (multivariable calculus, ODE’s, Fourier)

Note that I am listing topics here: the titles of courses varied quite a bit (for instance, the term “linear algebra” was not in common usage at the time).
Calculus was recommended, but not required for admission at this time.

1969:
Math Core was 11 units:
- Math 1-2 (calculus, linear analysis)
- Math 51 (multivariable calculus)
Some majors required 9 more units:
- Engineering and Physics required Math 52 (complex analysis), Math 111-112 (ODE’s, Fourier, Bessel)

1979:
Calculus now a requirement for admission (and a year of chemistry and physics are both required, instead of one or the other, and biology is recommended)
Math Core was 14 units:
- Math 7 (calculus), Math 8 (complex numbers, infinite series, approx), Math 10 (prob/stat)
- Math 38 (multivariable calculus), Math 73 (linear algebra)
Some majors required more:
- Engineering and Physics required Math 113-114 (ODEs, PDEs, Fourier)

1989:
Math Core was 13 units:
- Math 3 (calculus, 4 units), Math 4 (multivariable calc)
- Math 73 (linear algebra), Math 82 (ODE’s)
Some majors required more:
- Engineering and Physics required Math 115 (Fourier)
1999:

same as 1989, however:
- Engineering removed Math 115 as a major requirement in the 2001-2003 catalog
- Mathematics had a core revision, in which calculus went from a full course to a half course and prob/stat was added as a half course, and the other courses were divided into the first and second years

Thus students graduating in 2002 (and hence present in 1999) were subject to these changes.

2008:

Core is 13 units:
- Math 11-14 (calc, linear algebra I, ODEs, I m-v calc I, 2+2+1.5+1.5 units)
- Math 61-64 (m-v calc II, prob/stat, linear algebra II, ODEs II, 1.5 units each)

The physics major requires more:
- Physics requires Math 115 (Fourier)

By looking at these trends, what one observes is that, over time, the content of the math core has changed in response to the growing trend that high school students are learning more calculus (and even some elementary linear algebra) than before. Calculus, which was not a requirement for admission in 1969, was a requirement for admission in 1979, and the mathematics core evolved to reflect this background. As a result, the substantial content of ODE’s, which was (as late as 1979) only a requirement for engineering and physics majors, moved into the core. Also, linear algebra has developed in the last 50 years as a subject in its own right, with application to many fields of science and engineering, and grew in its prominence in the core. Probability and statistics made a brief appearance in the core around 1979, and has returned to the core in the last decade.

The new SVCC proposal for the Core has 9 units of mathematics (3 semester). Under this proposal, the mathematics core would keep the essential topics of multivariable calculus, linear algebra, and ODE’s that are critical for the mathematical background of all majors at the college, while removing some supplemental topics from these courses in favor of giving students more electivity. With this electivity, students who so choose could take more courses in these areas to further their mathematical development.

An alternate document outlines what topics are likely to remain the Math Core under the SVCC proposal.