NEW YORK FREE ACADEMY,
COR. LEXINGTON AVENUE AND TWENTY-THIRD ST.

To the Executive Committee on Free Academy:

Gentlemen: In obedience to your Resolution of the 14th December ult., we have the honor to remark, that, some years since it was suggested by the Executive Committee, that, inasmuch as many students left the Academy at the end of the first year, the elements of chemistry and natural science should be taught in the Introductory Class. The Executive Committee reasoned, and very properly, that much valuable information would thus be imparted to a large number of students who otherwise might never obtain any knowledge of either practical chemistry or of natural science. In conformity with these views, the suggestion was carried out and incorporated in the programme of the Course of Studies.

A professorship of natural science was created, and Dr. Doremus was appointed to the chair for the purpose of teaching that subject. His experience, together with that of all the other instructors in the Free Academy, has proved the wise and beneficial effects of this arrangement. It has been found that the students in the Introductory class took great interest in these branches, especially in that of the natural sciences. Their manuscripts and drawings which they have heretofore made under Dr. Doremus, have elicited high commendation from all who have examined them.

In addition to the utility of those studies to the youngest portion of the Free Academy, there is another reason equally important why these branches should be continued in the programme for the Introductory year, and that is, they give an agreeable relaxation from the more severe studies of the course, and fill up the time which otherwise might be spent in listlessness or indolence.

We, therefore, offer the following as our individual views, in reference to the arrangement of the Course of Studies in order that the chemical department and the department of natural sciences may have their due place in a systematical course of thorough mental training and liberal education, namely:

1. Make no alteration in the programme for the Introductory year; either in the first or second term.
2. In the second term of the Freshman year, add one recitation per week in Natural Science.

3. In the first term of the Sophomore year, add two recitations per week in Physics.

4. In the second term of the Sophomore year, add one recitation per week in Natural Science.

5. In the first term of the Junior year, add one recitation per week in Geology, and two recitations per week in Physics.

6. In the second term of the Junior year, change the title "Physics" to Inorganic Chemistry.

7. In the first term of the Senior year change "Physics and Applications," to Organic and Practical Chemistry.

8. In the second term of the Senior year, change "Chemistry" to Practical and Applied Chemistry, and add one recitation per week in Mineralogy.

All which is respectfully submitted.

Horace Webster,
John J. Owen,
G. B. Dochart.

We concur in the above report of the Committee.

J. Graeff Barton,
Chas. E. Anthon,
J. Roemer,
A. J. Morales,
G. W. Huntsman,
J. T. Benedict.

I agree with the above, except that I wish some instruction more for the Introductory class.

H. J. A. Koerner.

In Faculty Meeting, January 11, 1864.

Ordered, That the above communication of Professors Webster, Owen, Dochart, Barton, Anthon, Morales, Huntsman, Roemer, Benedict, and Koerner, be transmitted to the Executive Committee; also a copy of the Fifteenth Annual Register, containing the suggestions of these professors marked in the Course of Study.

Adolph Werner,
Secretary pro tem.
New York Free Academy,
Cor. Lexington Avenue and Twenty-third St.
January 11, 1864.

To the Executive Committee for the Care, &c., of the Free Academy:

Gentlemen: I agree entirely with the opinion of the other members of the Faculty, that more time should be devoted to the study of the natural sciences, and that this time should be distributed over the whole course. But I hope that the plan of adding several lessons a week to the Freshman and Sophomore courses, which are even now very difficult, will be regarded as a provisional arrangement merely. While it will require much careful thought to make the alterations necessary to allow the insertion of lessons in natural science without increasing the number of hours above four a day, and without injuring the other departments of study, I trust it will be satisfactorily determined at no distant day. It will, therefore, in my opinion, be best to defer the definite adjustment of the course until a few terms' experience shall enable the professors but recently appointed, the Faculty and the Committee, to judge practically of the best distribution of the subjects included in the departments of natural science and natural history, and until the increased conveniences which all of us desire and expect shall enable the professors of these departments to give their attention with equal economy and usefulness to all the classes in the Academy.

It is with much diffidence, though with all honesty, that I differ from the recommendation of the Professor of Chemistry to devote one year and a half, with an average of three and a third lessons a week to chemistry. It seems to me that this would introduce a chemical course suited perhaps to a polytechnic school, but too extended for an academy in which it must ever be the object to give an equal education to all the main faculties of the mind, to invest all subjects of study with nearly equal interest, and, by not making any one a speciality, give the student a true appreciation of their relative importance.

I think that instruction in mechanical drawing, perhaps one lesson a week, might be given with much advantage to the Junior class. Instruction in the elements of mechanical science and its commonest applications to machinery might be given the Introductory class.

I cannot allow this opportunity to pass without stating, although not asked to do so by the resolution of your committee, that in my
opinion, the students of the Introductory class have not enough work to do, especially in the first term. Therefore I not only agree with the other members of the Faculty, in thinking that none of the present studies of this class should be taken away, but wish that in addition to the lessons in mechanics, which I have suggested, a few lessons a week in drawing, might be inserted in the first term of the first year; these might be wholly additional, or transferred from the second term of the same year.

I have the honor to be, gentlemen, very respectfully yours,

ADOLPH WERNER,
Prof. of German Language and Literature.

IN FACULTY MEETING, January 11, 1864.

Ordered, That the above communication of Prof. Werner be transmitted to the Executive Committee.

ADOLPH WERNER,
Secretary pro tem.

NEW YORK FREE ACADEMY,
COR. LEXINGTON AVENUE AND TWENTY-THIRD ST.
January 7, 1864.

To the Executive Committee of the Free Academy:

GENTLEMEN: In answer to your resolution of December 14, 1863, requesting the Faculty of the Free Academy to give their written opinion individually to your honorable body, in reference to changes in the course of studies, in order that the practical scientific branches may receive the attention they demand, I have the honor to append the following list of changes, which in my judgment would be for the interest of the institution and of sound education. These are followed by a few remarks upon the studies of each year.

I am, very respectfully, your obedient servant,

JOHN A. NICHOLS,
Prof. of Mixed Mathematics.
COURSE.

INTRODUCTORY CLASS.

First Year—First Term.

Lessons per week.

Latin, \textit{Andrews & Stoddard's Grammar, Andrews' Reader}, \quad 5
or French, \quad \textit{Vannier and Robertson}, \quad 5
English Language, \quad \textit{Principles of General Grammar}, \quad 1
Algebra, \quad \textit{Docharty}, \quad 5
Elements of Physics, \quad 2
Introduction to Natural Sciences, \quad 2

First Year—Second Term.

Latin, \quad \textit{Caesar}, \quad 5
or French, \quad \textit{Robertson, Roemer's Polyglot and Elem. Readers}, \quad 5
Geometry, \quad \textit{Docharty}, \quad 5
Elements of Chemistry, \quad \textit{Reneick}, \quad 2
Introduction to Natural Sciences, \quad 2
Free-hand Linear Drawing, \quad 5
Oratory and Composition.

FRESHMAN CLASS.

Second Year—First Term.

\begin{itemize}
\item \textit{Latin}, \quad \textit{Virgil, and Anthon's Prose Composition}, \quad 3
\item \textit{Greek}, \quad \textit{Sophocles' Grammar and Lessons}, \quad 2
or French, \quad \textit{Robertson, Roemer's Polyglot and Second Readers}, \quad 3
\item Spanish, \quad \textit{Ollendorff, Morales' Reader, Butler}, \quad 2
\item English Etymology and Philology, \quad \textit{Fowler's Grammar}, \quad 1
\item Rhetoric, \quad \textit{Day}, \quad 2
\item Ancient History, \quad \textit{Willson}, \quad 2
\item Moral Philosophy, \quad \textit{Wayland}, \quad 1
\item Plane and Spherical Trigonometry, Navigation, \quad \textit{Docharty}, \quad 5
\item Descriptive Geometry, Drawing, \quad \textit{Docharty}, \quad 5
\item Oratory and Composition.
\end{itemize}
<table>
<thead>
<tr>
<th>First Year—First Term</th>
<th>Lessons per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instead of English Language substitute</td>
<td>1 (one),</td>
</tr>
<tr>
<td>English Language</td>
<td>2 (two),</td>
</tr>
<tr>
<td>Instead of Elements of Physics substitute</td>
<td>2 (two),</td>
</tr>
<tr>
<td>History</td>
<td>2 (two),</td>
</tr>
<tr>
<td>Add</td>
<td></td>
</tr>
<tr>
<td>Elements of Machinery</td>
<td>1 (one),</td>
</tr>
<tr>
<td>Drawing</td>
<td>3 (three),</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Year—Second Term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instead of Free-hand Linear Drawing substitute</td>
<td>5 (five),</td>
</tr>
<tr>
<td>Linear Drawing</td>
<td>4 (four),</td>
</tr>
<tr>
<td>Add</td>
<td>2 (two),</td>
</tr>
<tr>
<td>History</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year—First Term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instead of Moral Philosophy substitute</td>
<td>1 (one),</td>
</tr>
<tr>
<td>Natural Science</td>
<td>1 (one),</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year—Second Term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instead of Natural Science substitute</td>
<td>1 (one),</td>
</tr>
<tr>
<td>Natural Science Strike out</td>
<td>2 (two),</td>
</tr>
<tr>
<td>Roman Antiquities and Mythology</td>
<td>1 (one),</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Year—First Term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instead of Modern History substitute</td>
<td>5 (five),</td>
</tr>
<tr>
<td>Modern History</td>
<td>3 (three),</td>
</tr>
<tr>
<td>Add Physics</td>
<td>2 (two),</td>
</tr>
</tbody>
</table>
Third Year—Second Term.

Instead of

Logic ................................................................. 3 (three),
Natural Science .................................................. 1 (one),
substitute
Logic ................................................................. 2 (two),
Natural Science .................................................. 2 (two).

Second Year—Second Term.

<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
<th>Lessons per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin,</td>
<td>as before, and Anthon's Versification,</td>
<td>2</td>
</tr>
<tr>
<td>Greek,</td>
<td>Queen's Reader,</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>as before,</td>
<td>2</td>
</tr>
<tr>
<td>Spanish,</td>
<td>as before, and Iriarte's Fables,</td>
<td>3</td>
</tr>
<tr>
<td>Rhetoric,</td>
<td>Jamison,</td>
<td>2</td>
</tr>
<tr>
<td>Medieval History</td>
<td>Willson,</td>
<td>2</td>
</tr>
<tr>
<td>Roman Antiquities and Mythology,</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Analytical Geometry, Mensuration, Surveying,</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Natural Science (Lecture),</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Drawing, Perspective, Shades and Shadows,</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Oratory and Composition,</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOPHOMORE CLASS.

Third Year—First Term.

<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
<th>Lessons per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin,</td>
<td>Cicero,</td>
<td>2</td>
</tr>
<tr>
<td>Greek,</td>
<td>Anabasis,</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French,</td>
<td>as before, and Noel &amp; Chapsal, instead of Robertson,</td>
<td>2</td>
</tr>
<tr>
<td>Spanish,</td>
<td>as before, and Quintana's Lives,</td>
<td>3</td>
</tr>
<tr>
<td>English Synonymes,</td>
<td>Graham,</td>
<td>2</td>
</tr>
<tr>
<td>History and Sources of the English Language,</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Modern History,</td>
<td>Willson,</td>
<td>5</td>
</tr>
<tr>
<td>Political Economy (Lecture),</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Differential Calculus,</td>
<td>Davies,</td>
<td>2</td>
</tr>
<tr>
<td>Free-hand Drawing, Course of Ornament,</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Oratory and Composition,</td>
<td></td>
<td></td>
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</tbody>
</table>

Third Year—Second Term.

<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
<th>Lessons per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin,</td>
<td>Sallust,</td>
<td>2</td>
</tr>
<tr>
<td>Greek,</td>
<td>Cyropoeidia,</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td>Lessons per week</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>French, Noel &amp; Chapsal, Molière, and Racine</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Spanish, Sales' Gram., Ascarzorta, Moratin, Pitarro</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>English Literature, Shaw</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Logic, Whatley</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Intellectual Philosophy, Mahan</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Integral Calculus, Davies</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Natural Science (Lecture), Drawing, Architecture, and Study of the Antique and Figure, Oratory and Composition</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**JUNIOR CLASS.**

**Fourth Year—First Term.**

<table>
<thead>
<tr>
<th>Language</th>
<th>Lessons</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin, Latin</td>
<td>2</td>
<td>Livy,</td>
</tr>
<tr>
<td>Greek, Greek</td>
<td>3</td>
<td>Iliad,</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish, Sales, Moratin,</td>
<td>3</td>
<td>Don Quixote, Quintana's Parnaso,</td>
</tr>
<tr>
<td>German, Glaubensklee's</td>
<td>2</td>
<td>Grammar and Reader,</td>
</tr>
<tr>
<td>English Language,</td>
<td>1</td>
<td>Fosler,</td>
</tr>
<tr>
<td>Critical Readings, English</td>
<td>1</td>
<td>Hickok,</td>
</tr>
<tr>
<td>Moral Philosophy,</td>
<td>3</td>
<td>Bartlett,</td>
</tr>
<tr>
<td>Analytical Mechanics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Themes, Forensic</td>
<td></td>
<td>Discussions, Original Declamations.</td>
</tr>
</tbody>
</table>

**Fourth Year—Second Term.**

<table>
<thead>
<tr>
<th>Language</th>
<th>Lessons</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin, Horace</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Greek, Odyssey</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German, as before</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>English Literature,</td>
<td>2</td>
<td>Shaw,</td>
</tr>
<tr>
<td>Natural and Revealed</td>
<td>4</td>
<td>Butler's Analogy, Mahan's Logic,</td>
</tr>
<tr>
<td>Religion, Physics,</td>
<td>2</td>
<td>Bird,</td>
</tr>
<tr>
<td>Acoustics and Optics,</td>
<td>3</td>
<td>Bartlett,</td>
</tr>
<tr>
<td>Spherical Astronomy,</td>
<td>2</td>
<td>Bartlett,</td>
</tr>
<tr>
<td>Lecture on Rhetoric</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Themes, Forensic</td>
<td></td>
<td>Discussions, Original Declamations.</td>
</tr>
</tbody>
</table>
## SENIOR CLASS

### General Remarks

- Lessons per week:
  - Fifth Year—First Term:
    - Ancient Course, Latin or Greek: Horace, Thucydides, 1
    - A Modern Language at option: 4
    - or German: 5
    - Physics and Applications: 4
    - Civil and Military Engineering: Mahon, Benton, 4
    - Law and Politics: Hamilton, 2
    - Themes, Forensic Discussions, Original Declamations.

### Fourth Year—First Term

- Add
  - Physics: 2 (two),
  - Geology: 1 (one).

### Fourth Year—Second Term

- Instead of Physics, substitute Inorganic Chemistry: 2 (two).

### Fifth Year—First Term

- Instead of Physics and Applications, substitute Chemistry: 4 (four).

### Fifth Year—Second Term

- Add Practical Mineralogy: 1 (one).

### Fifth Year—Second Term

- Ancient Course, Latin or Greek, Horace, Oedipus Tyrannus, 1
  - The same Modern Languages as before: 4
  - or German: 5
  - Chemistry: 4
  - Civil and Military Engineering: as before, 4
  - Law and Politics: Kent, Woolsey, 2
  - Themes, Forensic Discussions, Original Declamations.
GENERAL REMARKS.

INTRODUCTORY CLASS.

To keep this class fully employed, it should, in my judgment, have at least twenty (20) lessons per week. It has now only fifteen in the first term and nineteen in the second; I have, therefore, recommended the additions of lessons in both terms.

FRESHMAN CLASS.

The one lesson in moral philosophy may, I think, be omitted, since the subject is studied critically in the Junior year. This will make room for one lesson in natural science.

SOPHOMORE CLASS.

The Sophomore as well as the Freshman class, has at least twenty lessons per week, which is, perhaps, all that should be required of students. I have recommended changes in both the first and second terms. The single change in the subject of logic will, I think, do no harm to the course of logic, which I regard as a most practical and useful study.

JUNIOR AND SENIOR CLASSES.

The students of these classes have about fifteen lessons per week. More can, I think, be added without harm, as recommended.

The changes I have recommended above, leave undisturbed those important branches of a sound education which give vigor to the mind and the power of expression, viz.: Languages, pure and applied mathematics, literature, and logic. To teach astronomy and its applications to navigation and higher surveying more practically than we have now the means of doing, an observatory should be connected with any suitable building which may be added to give increased facilities for teaching science practically. This observatory
should be furnished with two or three good instruments, to which the classes may have access under the charge of the instructor. In such a building, in addition to an observatory and ample rooms for chemistry, physics, and natural history, it would, in my judgment, be of great advantage to the institution if a room with proper light could be provided, furnished with tables, drawing-boards, &c., and used to give practical instruction, under the direction of a competent teacher, to the students of the higher classes in machine, architectural and topographical drawing.

All which is respectfully submitted.

J OHN A. NICHOLS,
Prof. of Mixed Mathematics.

FREaE ACADEMY, January 7, 1864.

NEW YORK FREE ACADEMY,
COR. LEXINGTON AVENUE AND TWENTY-THIRD ST.,
January , 1864.

To the Executive Committee of the Board of Education for the Care, Government, and Management of the Free Academy:

GENTLEMEN: I have had the honor of receiving through Mr. Boesé, Clerk of the Board, your communication bearing date December 15, 1863. I take great pleasure in responding to your request to give a "written opinion in reference to changes necessary in the course of studies pursued in the Free Academy, in order that the Practical Scientific branches may receive the attention they demand;" and further, I reply the more cordially as this is the first occasion in which, as an individual member of the Faculty, I have been accorded the privilege of expressing my sentiments on this subject.

In the Fifteenth Annual Register of the Free Academy, for 1863 and 1864, I find the following:

"On January 20th, 1847, a report was presented by said Committee, recommending the establishment of a 'Free College or Academy,' and representing its nature and object in this language: 'Your Committee will briefly remark, that their design is to offer the idea of a college, in which, while it shall be in no way inferior to any of our
colleges in the character, amount, or value of the information given to the pupils, the course of studies to be pursued will have more especial reference to the active duties of operative life, rather than those more particularly regarded as necessary for the pulpit, bar, or the medical profession."

We learn from this extract, that the founders of the Free Academy evidently contemplated the establishment of an institution adapted to the progressive ideas of the nineteenth century, and eminently worthy of the position of the largest and most enterprising city on this hemisphere.

They intended to employ the money raised from its citizens by taxation for the free education of the sons of no one class, but to meet, as far as practicable, the wants of all classes of society; though, if there be a leaning in any direction, it is in favor of the "active duties of operative life."

In my opinion, the Free Academy has accomplished its aim in part only. Thus, in moral, intellectual and political philosophy—in the English language and literature—in history and belles-lettres—in the French, German and Spanish languages—and, more especially, in pure and mixed mathematics, and in drawing, it has, at least equalled, if not excelled, any of the colleges of our land. But in the Latin and Greek languages—in chemistry and physics—in physical geography, geology, mineralogy, and other branches of natural history, the Free Academy is surpassed by both the other colleges of our city, by the colleges in other parts of our state, by the colleges of other states of our Union, and even by those recently established in the southern, western, and extreme northwestern parts of our country.

With regard to the ancient languages, students are permitted to enter the Free Academy without the most elementary knowledge of them, whereas, in other colleges, students are examined in the classics; and, I am informed by the professor in this department, in some colleges, the requirements for entrance are made almost equal to the attainments made by our graduates. This might be remedied, in part, by obligating the scholars of the common schools proposing to become candidates for the classical course of the Free Academy to prepare themselves in these studies for an examination. This would permit of more time being employed for the practical sciences.
The languages are unquestionably advantageous, not only to every scholar, to candidates for the ministry, the medical and legal professions, but to those pursuing scientific and practical departments, to afford them a clearer insight in the structure of their own language; and it is actually necessary, in order to comprehend the origin and meaning of technical terms, which are chiefly derived from the Latin and Greek.

But that their study should be pursued with the hopes of appreciating fully the poetry and eloquence of the ancients, is unnecessary for "the active duties of operative life;" and especially, when we consider the brief period which a young American student feels he can devote to collegiate study, and the vast scientific themes opened up in this century, capable alike of developing religious and moral sentiments; strengthening every faculty of the mind; demanding the highest mathematical and reasoning powers; and, with their endless, ever new, refreshing, and fascinating topics, enabling the student to soar above the poetry of the ancients, and, at the same time, imparting to him a knowledge which he can make practically useful to himself and to society.

New York is world-renowned as a commercial city; hence we should provide such information as can be of practical service to those destined for such enterprises. By this is meant, not merely that the graduate should be a good accountant and book-keeper, and familiar with the prominent languages employed in traffic, but that he should be thoroughly instructed in all that is known of the various countries of our globe as to relative position, climate, mineral, vegetable, and animal productions.

These themes would be included or comprised under the heads of physical geography, or the physiology of the globe. (At Nassau Hall, Princeton, N. J., they have a special professorship for this subject, and have appointed one of the most eminent physical geographers living, to this chair.)

Some of the grandest fortunes accumulated by our "merchant princes" have been made by a skilful application of an intelligent knowledge of the geographical relations of the various parts of our earth; and it is only by enlarged views that the mercantile pre-eminence of our city can be maintained.

Since our ships visit every clime, the sons of New Yorkers, who desire to devote themselves to this branch of active life, should be
provided with a practical knowledge of the means of traversing the "trackless ocean."

Not only, therefore, the science of "navigation," but the principles involved in the structure of vessels, should be afforded to the student. Has not this country taught all the world a lesson in naval architecture?

Agriculture is one of the greatest sources of wealth to our country. Should not our young men possess the advantages which the science of chemistry offers in this field?

The mineral richness of our country is inexhaustible.

Our coal mines exceed in quantity and variety, though all other storehouses of fuel yet discovered be combined.

American coal oils are among the novelties now seen placarded through all the large European cities.

There are no metallic deposits comparable in quantity and purity to the vast masses of native copper of Lake Superior. The zinc of New Jersey is unsurpassed in excellence.

The endless varieties of iron ores need but scientific applications to their working to compete even with the cheap labor of the Old World, in the production of the most valuable of all the metals.

The rich products of the California gold-fields, only revealed since 1847, have attracted the attention of the whole civilized world, and as a consequence we have seen a state almost born in a day.

The mines of quicksilver, under the charge of a German chemist, are rivalling the value of the nobler metal.

Many millions of dollars are invested in this city alone in the refining of sugar.

The invention of Melseus, a Belgian chemist, for obtaining the white crystallized sugar directly from the cane and the sugar-beet, all but dispensed with these enormously profitable establishments. (The experiment was a laboratorial success, and though it failed on the large scale, who can tell when and by whom it may be fully accomplished?)

The gunpowder factories of Dupont, and of Hazard, exceed in magnitude any in Europe, and require not only mechanical but the highest order of chemical skill.

Our print works demand a corps of chemical colorists; high salaries are paid to those skilled in this art.

The glass made at the Atlantic works in Brooklyn, took the first prize at the London Exhibition, 1851, for purity, transparency, and brillian-
A celebrated French chemist accumulated an enormous fortune from his improvements in this art, as well as conferring a great benefit on us all, in furnishing plate-glass at a more reasonable rate. Prof. Liebig has recently invented a new and greatly improved method of silvering instead of mercurializing mirrors.

Do not our gas works, our candle and soap factories, and an almost infinite variety of other departments of practical life, demand the intelligence of the educated chemist?

Witness the improvement in the vulcanizing of India-rubber, an almost invaluable article.

The art of photography gives employment to thousands of operators, the American artist standing in the foremost rank.

The department of physics has likewise its practical applications.

The Almighty seems only within the past hundred years to have permitted man an insight into the more exact laws connected with the imponderable forces, such as heat, light, electricity, and magnetism.

Have we not the steam-engine, the electric telegraph, the photographic art, and the new and most excessively delicate method of analysis by the sunbeam, as first fruits of the grand results we may hope for, from the study of these departments of science?

Does not our city boast of Fulton, of Morse, and of Draper?

The founders of the Free Academy state that their design is to offer the idea of a college, in which, while it shall be in no way inferior to any of our colleges in the character, amount, or value of the information given to the pupils, etc.

Again, it is believed that they will be regarded with additional favor and attended with increased satisfaction, when the pupils and their parents feel that the children who have received their primary education in these schools can be admitted to all the benefits and advantages furnished by the best endowed college in the state, without any expense whatever.

Again, the certainty to a young man of good abilities, and desirous of making large acquisitions in knowledge, of having the opportunity of gaining as extensive an education as can be acquired in any institution in the state, and also should furnish peculiar facilities for the instruction of the highest order in various branches of knowledge omitted altogether in other colleges, or not practically taught.

In my opinion, although we may have surpassed our sister colleges in giving instruction in the higher mathematics, in the modern languages and in drawing, yet we are inferior to them in other respects.
Our oldest institution, "Columbia College," has recently awakened from its lethargy, and suitable provisions have been made for teaching practically analytical chemistry, photography, and mineralogy. Thirty thousand dollars have been expended in physical and chemical apparatus. The lecture-rooms of these departments are separated, that the fumes of the laboratory may not destroy the valuable instruments. For charts and diagrams to illustrate the department of physics fifteen hundred dollars was appropriated. Their professor of chemistry even still claims that the provisions are insufficient.

In the "University" of this city separate lecture-rooms are devoted to natural philosophy and chemistry, and a practical laboratory has been in operation for many years.

At Union College, Schenectady, N. Y., a chemical laboratory was constructed and furnished for instruction in analytical chemistry. (Accompanying are the plans of these laboratories.)

At Hamilton and other colleges of this state, similar conveniences have been provided for the study of this science.

In the "Rochester University" the museum of mineralogy and geology cost $30,000.

If we leave our state and pass to "Yale College" in Connecticut, to "Brown University" in Rhode Island, to "Harvard College," Massachusetts, we find not only magnificent geological and mineralogical cabinets, but museums of natural history, and most extensive conveniences for the study of analytical chemistry.

In the University of Mississippi, a most valuable apparatus as well as extensive building for practical study was provided. The glass electrical machine cost $3,000.

At Ann Arbor, Michigan, a university is established surpassing any institution of learning in our city, offering free instruction to students and paying salaries to the professors nearly double those paid in New York.

If we go abroad, we not only see in the largest cities of the Old World ample provision for the practical study of modern science, but even small towns have become world-renowned because of the splendid attractions offered to the scientific student.

Professor Liebig, whose chemical instruction in the dirty little village of Giessen rendered himself and his town famous, was subsequently invited to Munich, and ample funds provided him for erecting his laboratories, which have been models for the world. (See Charts.)
The people of Borem on the Rhine have recently invited the German chemist Hoffman (now in London) to their city. They have offered him $150,000, and two years to visit, with his architects, the laboratories of Europe—draw his plans, and erect his buildings. At the end of that time, they are to give an additional sum for purchasing apparatus and chemicals.

I might allude to other cases. It is to these laboratories that not only European, but American students flock.

To demonstrate the value of the knowledge there obtained, there are graduates of the schools of mines now in this country who are receiving from $5,000 to $25,000 salary per annum.

I would venture to suggest to the Committee in the first place, a modification of the plan of study in general, that the subjects of Physics, Chemistry, and Natural History, be extended over the whole five years' course of instruction, and that the practical laboratorial instruction be given to the advanced classes.

For years past too much time has been devoted to entertaining the Introductory class in the elements of physics and chemistry, and in the "Introduction to the natural sciences," to the exclusion of more thorough instruction of the higher classes. For example seven ninths of the time employed this term by the "Professor of Natural History and Physiology," and of the time of the "Professor of Physics and Chemistry," in instructing their respective departments, has been devoted to the Introductory class in giving Elementary instruction, and the remaining two ninths to the Senior class.

The Professor of Natural History has during two years past, repeatedly made efforts to have this modified, by hearing the recitations of two sections during the same hour, instead of some days meeting two and others a single section at a time. Such an arrangement would have given at least three additional hours each week for the higher classes.

There was always an insuperable objection, owing to the impossibility of crowding the whole Introductory class in the physical and chemical lecture-room; where two hours are recorded in the schedule for the elements of physics or chemistry, in reality four hours are employed, the lecture being delivered to only one half of the class at a time.

With the present inconvenience of not only a small room, but also only one for the illustration of physics and chemistry, it is impossible to shift the experiments more than twice a day, in addition to their preparation and adjustment.
Hence I would suggest, in order that the professor may do justice to the higher classes, that he be required to deliver two lectures (occupying four hours) a week to the Introductory class, only during the second term. That, in consequence of said class receiving two hours' instruction in natural science (that is, at least seven hours of the time of the professor), the lecture to said class on physics be omitted during the first term.

Now, although the discussion of these themes is attractive and entertaining to the youngest class, opening their eyes to the vast fields of science, yet, as it precludes the possibility of meeting the higher classes with sufficient frequency to impart thorough knowledge of these subjects, this plan seems indispensable.

No better proof can be offered that our present course is either badly arranged, or the subjects imperfectly taught, or perhaps both, than the humiliating fact that only one tenth of those who enter the Academy remain till the final year.

Our course is not sufficiently attractive to the active American boy to compete with the temptations to enter into pursuits more immediately lucrative; he does not simply wish to be entertained, he desires something more practically serviceable.

Instead of the four hours devoted by the Professor of Chemistry during the first term to the Introductory, let this be divided between the Sophomore and Junior classes, making two lectures to each, and if possible to give three lectures to each of these classes (being six hours thereafter), employing the two hours which during the last term have been occupied in monitory duties in the chapel.

I think that not only could the time of the Professor of Chemistry, but the valuable time of the other professors, be better employed than in performing the trivial duties of police officers; and would recommend that a suitable person should be employed for this service, which could be done at half the present expense.

By devoting these hours (especially if three should be given) to the Sophomore and Junior classes in the first term, in addition to the three hours given by the Professor of Mixed Mathematics to the Junior second term on acoustics and optics, would make the course more complete than at present, and yet would leave the second term Junior and the first and second terms of the Senior years for inorganic, organic, and practical, technical and applied chemistry (being the same number of terms employed by the Professor of Chemistry in Columbia College, viz., three).
Then during the second term the existing arrangement might for the present continue, viz.: two lectures a week to the Introductory, occupying four hours (since each lecture has to be repeated, owing to the limits of the room).

Two lectures per week to the Junior class as before, excepting that "Inorganic Chemistry" be substituted for "Physics," and four lectures a week to the Senior class as before, only changing the theme from physical to technical and applied chemistry, the first term of the Senior year having been devoted, as mentioned, to organic and practical chemistry.

The chief modification proposed then in this department, would be to devote the time previously given to the Introductory, to the Sophomore and Junior classes, and, if possible, the hours now devoted to guard duty, as it is impossible, with the present lecture-room, to do more, and to change the themes as above stated.

The Professor of Natural Science is obliged to spend ten hours a week with the class, one hour being devoted to a lecture, while nine hours are employed in examinations, sometimes one section meeting, and at others, two.

It is proposed to continue the lecture as heretofore, and arrange the sections, so that they shall always recite in double sections. As there are twelve sections in this class, it would require six hours to hear the class recite. This with the lecture would make seven hours in the week, instead of ten, while the time of the student would be the same as at present.

In the second term Introductory, the professor has been required to spend eight hours a week with the class, giving one lecture only, seven hours being spent in examinations. The same system of recitation in double sections, might be employed with advantage.

In the second term Freshman, add one lecture in natural sciences, two per week. In the second term Sophomore, add one lecture per week in natural sciences, two per week. In the first term Junior, add one or two lectures per week in natural science. In the second term Senior, add one or two recitations per week in practical mineralogy and blowpipe assay.

By following such a plan, the various subjects could be adapted to the understanding of the pupils, the more advanced students taking the more advanced and difficult branches, while the subjects which require less study and previous knowledge, could be given to the lower classes.
To carry out the ideas proposed by the founders of this institution, additional lecture-rooms are required.

The subject of physics should be illustrated in a separate room from that of chemistry, else the apparatus would be soon destroyed, requiring, therefore, two lecture-rooms. A third lecture-room should be provided for lectures on physical geography, geology, mineralogy, physiology, hygiene, &c.

For practical instruction in astronomy, an observatory, with its appurtenances, should be constructed.

We need also a museum for natural history with its cabinets of geology, mineralogy, &c., also many additional illustrations for the departments of physiology and hygiene; and while theoretical instruction is afforded in said doctrine, we need a gymnasium for applying said teaching for the development of health, the surest basis for active, vigorous, and intelligent minds; also a room for practical mineralogy, large maps, charts, and diagrams, is also needed.

In the department of physics we require not only suitable room for preserving the apparatus in cases, but we need great increase in the number and variety of instruments, as well as a work-room for repairs, drawng charts, &c.

In the chemical department we should have a series of rooms for analytical chemistry, provision being made of suitable tables with their reagents, &c. (see drawings), for at least sixty students, a small room for students' balances; also small room for sulphide hydrogen, one for assay purposes, two for photographic purposes, one large room for chemistry applied to the arts, with necessary conveniences (see charts), a store-room for bulky chemicals, a private analytical and a private balance-room for the Professor of Chemistry.

Since the foundation of the Free Academy no addition to the original building has been made, nor was the idea of its founder (or suggester) ever carried out, viz.: of erecting an adjoining building for the chemical laboratories, that the fumes arising therefrom might not annoy the professors and students, nor destroy valuable physical apparatus.

The first Professor of Chemistry was obliged to arrange a laboratory in the basement, where no flue existed for a furnace or a fireplace, and the humidity was so great as to rust every metallic instrument. Even at that time the physical apparatus was placed in the library away from the corrosive gases; but the increase in the volumes of
the Library, drove the apparatus into its present place; its nearly destroyed condition is a sufficient testimony against this plan.

As the number of students has increased sixfold since the opening of the institution, it can be readily understood that we "must enlarge our borders and strengthen our stakes."

According to the quotation from the memorial presented to the legislature, "the Board of Education were to be authorized to call on the supervisors from time to time, to raise by tax such sums as may be required for the erecting, furnishing, and fitting up of said college or academy and supporting the same."

Also "to direct the course of studies therein, and in all things for the good government and management of the said Free Academy, and to purchase the books, apparatus, stationery, and other things necessary and expedient to enable the said Free Academy to be properly and successfully conducted, and to keep the said building properly repaired and furnished."

I believe that it is greatly to be regretted that fifteen years have elapsed without the introduction of the practical scientific branches originally contemplated, and that at present it is essential, not only for the success, but even the existence, of this institution, that vigorous and generous measures should be at once adopted for meeting the present demands of the public. It cannot be said that the professors have neglected to instruct faithfully in the departments as arranged by the Board of Education, for there are no professors in kindred institutions called upon to devote as many hours per diem, by one third Nor can the public complain of large sums being expended on salaries; for not one professor could "keep house," as the phrase is, in this city, without being aided by an income from other sources.

There are even ladies' schools in New York who remunerate twice as liberally for scientific instruction as the Free Academy.

If it is the desire of the Board of Education to raise the standard of excellence in its literary and scientific institutions, it should adopt the mercantile practice, for it is but just that those intrusted with the mental training of youth, should be as adequately rewarded as if they should apply their talents with equal zeal in the ordinary pursuits of life. There are many of superior mental cultivation who can't afford to employ their time in teaching—and many teachers who suffer the harassing annoyances of close daily calculations of every dime expended, because of an honest pride in their honorable position, or because circumstances are not favorable for a change.
This is not worthy of our great city. I claim that the Board of Education should act with a liberality commensurate with the wealth, greatness, and general nobleness, which characterize the citizens of New York.

Furthermore, I believe that if the Board of Education question the advisability of appropriating a large sum for the erection and furnishing of suitable buildings for practical scientific study, that it can be raised by private subscription. Private generosity has established scientific schools at Cambridge, New Haven, and other places. Tell me not that the citizens of New York will be behind those of any other city in our Union, when one has already devoted three fourths of a million during his lifetime for public instruction—and one just deceased has left one million for the erection of an hospital.

I believe, however, that should the community thoroughly understand the objects and aims contemplated therein, it would be cheerfully responded to, and by none more readily than the intelligent mechanic and operative, whose children would here reap especial advantages.

I will heartily co-operate with the members of the Committee in any plan to attain these results.

I have the honor to remain, your obedient servant,

R. Ogden Doremus.

New York, Jan. 15, 1864.

To the honorable, the Executive Committee of the Free Academy:

Gentlemen: In reply to your request for information regarding changes in the scientific course in the Free Academy, I would respectfully state, that since the foundation of the institution in 1846, an important change has taken place in all our colleges. At that time they were intended exclusively for furnishing instruction to those who were to follow professional pursuits, in the church, law, or medicine.

But experience showed that this did not come up to the requirements of our country. No provision was made for young men intended for manufacturing and engineering pursuits, though there was an increasing demand for that kind of information; none for those who were interested in mining and mineralogical occupations, though it was
already seen that the mineral wealth of the country was inexhaustible; none for those who were to be engaged in affairs connected with navigation, though this city was especially concerned therein. In fact such subjects as chemistry, geology, the arts applied to manufactures, and indeed all the practical sciences and arts properly so called, were kept in a subordinate position, and scarcely any provision made for them.

But, ten or fifteen years ago, it was found that public disapproval was manifesting itself towards those institutions, and persons refrained from sending their children to them, in the belief that the information imparted was not what they wanted. Perceiving this, the colleges, one and all, commenced to make a change, and to give these subjects a prominence they never had before.

The Free Academy is, and ought to be, far more affected by these influences than any college. From its first organization, it was intended to supply knowledge to those expecting to devote themselves to the practical affairs of life; yet suitable provision has never been made to enable it to accomplish this desirable result. It has no sufficient lecture-rooms, or laboratory, in which practical chemistry can be taught; no suitably extensive mineralogical or geological collections—not even the necessary diagrams and charts which geology requires—no room for their use. It has no instruments for the examination of minerals according to the modern methods, or for ascertaining what they contain. In the department of natural history, it has only a skeleton and a manikin; while the great subject of astronomy, and its application to navigation, is obliged to be taught without a telescope, or a log-line with its sand-glass, or even a mariner's compass.

It is plain, that a very great change must necessarily be made, and means, at once, economical, but effectual, supplied, for meeting these defects. Among these may be mentioned additional lecture-rooms, of size sufficient to suit the classes; apartments in which the chemical, geological, and mineralogical collections may be stored, and the purchase of necessary specimens and apparatus provided for.

It would further appear, that the change in course of instruction should be based on this idea: that, instead of these important practical sciences predominating in the lower classes, when the mind of the pupil is altogether too immature for the purpose, they should be extended into the later periods of study, and cultivated most actively when the student is just about to leave the Academy and enter on practical life.
I would therefore recommend, if anything, a curtailment of them in the earlier years, and corresponding expansion or extension in the later. The following statement will indicate what is the arrangement at present, and how the foregoing idea may be carried out:

As it is now arranged, the Professor of Chemistry is obliged to spend a large part of his time with the Introductory class, during both terms. By reducing it to one term valuable time would be gained which could be transferred to the higher classes. In the first term Sophomore, add two recitations per week in physics. In the first term Junior, add two per week in physics. In the second term Junior, change physics to inorganic chemistry. In the first term of the Senior, change physics and applications to organic and practical chemistry. In the second term Senior, change chemistry to practical and applied chemistry.

The Professor of Natural History is obliged to spend ten hours a week with the Introductory class, one hour being devoted to a lecture, while nine hours are employed in examinations, sometimes one section reciting and others two.

It is proposed to continue the lecture as heretofore, and arrange the sections so that they shall always recite in double sections. As there are twelve sections in the class it would require six hours to hear the whole class recite; this, with the lecture, would make seven hours a week instead of ten, while the time of the student would be the same as at present.

In the second term Introductory, the professor has been required to spend eight hours a week with the class, giving one lecture only, seven hours spent in examinations. The same system of recitation in double sections might be employed with advantage.

In the second term Freshman, add one in natural science, two per week. In the second term Sophomore add one lecture per week in natural science, two per week.

In the first term Junior, add one or two lectures per week in natural science. In the second term Junior, add one or two lessons per week in practical mineralogy and blowpipe assay.

By following such a plan the various subjects could be adapted to the understanding of the pupils, the more advanced and difficult branches being allotted to the advanced students, while the subjects which require less study and previous knowledge could be given to the lower classes.
In order to carry out such a course in a proper manner, suitable lecture-rooms and museums for specimens, apparatus, and practical instruction, are urgently needed in the departments of chemistry, natural history, and astronomy.

Hoping that the Executive Committee will view with favor the changes suggested above, and furnish the department with means required for carrying them out,

I am, gentlemen, yours very respectfully,

John C. Draper.