

## (2) MATHEMATICS AND THE PHYSICAL AND NATURAL SCIENCES

### XII. MATHEMATICS

The mathematical courses described in the following pages fall into four groups, viz: Pure Mathematics; Mathematical Physics; Astronomy; Engineering Sciences. The course in Advanced Calculus is the foundation of each of these groups and should be taken in Junior year. The students in Pure Mathematics should also take the courses in Analytical Geometry, Projective Geometry, and Higher Algebra, some time in their Junior and Senior years; those in Astronomy the courses in Analytical and Celestial Mechanics; those in Mathematical Physics the course in Analytical Mechanics; and those in Engineering Studies the courses in Descriptive Geometry and Machine Drawing, and in Machine Designing.

Students desiring to take honors in mathematics, or intending to pursue graduate studies in any one of the above lines, should follow this scheme rather closely.

As modern mathematical literature is largely in French and German, students should acquire as soon as possible a good reading knowledge of these languages.

It is desirable even for students of pure mathematics that they should acquire the elements of descriptive geometry, and facility in the use of drawing instruments.

The seminary rooms and mathematical laboratory at 90 High Street are open to students taking the more advanced courses.

A 1 *Solid Geometry, Plane Trigonometry, and Analytical Geometry.* [Freshmen.] 3 hrs.  
Professor BEEBE, Assistant Professor HAWKES, Drs. GALE and WILSON.

B 1 *Calculus* [after A 1]. 3 hrs. only

Professor PHILLIPS.

The elements of the Differential and Integral Calculus including the elements of Differential Equations.

B 2 *Spherical Geometry and Trigonometry; Surveying, Navigation, and Nautical Astronomy* [after A 1]. 3 hrs.

Professor E. L. RICHARDS.

A short course in Surveying, and an elementary course in Navigation and Nautical Astronomy. Instruction in the use of the sextant will be given to pupils desiring it.

B 3 *Analytical Geometry.* [Juniors and Seniors.] 2 hrs.

Dr. GALE.

A course in the elements of Plane and Solid Analytical Geometry adapted to the needs of students of Engineering, Physics and pure Mathematics.

B 4 *Higher Algebra.* [Juniors and Seniors.] 2 hrs.

Assistant Professor HAWKES.

This course treats those algebraic facts and methods which are indispensable for the further pursuit of pure or applied Mathematics and highly desirable for one who expects to teach.

B 5 *Geometry.* [Juniors and Seniors.] 2 hrs.

Assistant Professor HAWKES.

Historical and critical study of elementary Geometry, especially intended for those who expect to teach.

Those who propose to take course B 6 must consult Professor Phillips beforehand, whose approval, in writing is required. This course together with course C 6, for Seniors, is designed especially for students who intend to take a graduate course in Mechanical Engineering.

Yale



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**\*B 6** *Descriptive Geometry and Machine Drawing.*

3 hrs., to count as 2 hrs.

Professor C. B. RICHARDS and Assistant Professor MARSHALL.

Course B 6 is open only to a limited number of those who have studied the Mathematics of the Sophomore year. The course includes the principles of orthographic projection, the intersection and development of surfaces; in the second term, elements of machine drawing.

**B 7** *Descriptive Astronomy.* [Juniors and Seniors.] 1 hr.

Professor BEEBE.

Intended principally for the study of the historical and physical side of Astronomy. Opportunity is given for the use of the telescope. Text-book: Young's *Elements of Astronomy*.

**\*B 8** *Surveying.*

to count 1 hr.

Professor BEEBE.

Field work with level, transit and plane table; correction of instrumental errors; drawing contour maps. Required of those electing Geology C (see p. 129) and open to them only.

**C 1** *Advanced Calculus* [after B 1].

2 hrs.

Dr. WILSON.

Gives the student an extended and practical formal knowledge of Calculus such as is of great use in pure Mathematics and indispensable in the applications to Engineering and Physics.

**C 2** *Analytical Mechanics* [after B 1].

2 hrs.

Dr. GALE.

In this course the Calculus is applied to the solution of problems on the motion and equilibrium of a point, motion in a plane, and equilibrium of a rigid body.

**\*C 3** *Introduction to Mathematical Physics.*

Dr. WILSON.

This course is to meet the needs of students of Physics, Engineering, theoretical Chemistry, and to afford students of Mathematics an insight into the simpler applications.

**\*C 4** *Celestial Mechanics* [after B 1, B 2 and C 2].

Professor BEEBE.

Development of formulae and numerical calculations determining the parabolic orbit of a comet from three observations.

Computation of an ephemeris and reduction of observations for comparison with the ephemeris.

The course may be carried on through a second year computation of elliptic orbits and the discussion of perturbations. Omitted in 1904-1905.]

**C 5** *Projective Geometry.*

Professor PIERPONT.

Both the analytic and synthetic methods will be used to develop the fundamental properties of points, lines, conics, and quadric surfaces and the linear transformations.

**\*C 6** *Machine Designing.*

8 hrs., to count as 4 hrs.

Professor C. B. RICHARDS.

Course C 6 is a continuation of the work in course B 6 open only to a limited number of those who have taken that course.

