

commercial fertilizers, milk, and grain. *Spring term, full study.*  
Professor PALMER.

*Required:* Chemistry, 1, 2, 3, 4, 5.

8. Technological and Industrial Chemistry.—This course comprises a study of the best practice of iron and steel laboratories, test departments, etc., with special reference to rapid methods. It includes the technical analysis of pig iron and steels, paints and pigments, gas, etc. The class room work is chiefly devoted to the special applications of chemistry to the arts. Instruction is by lectures and recitations upon assigned topics in standard works of reference. *Wagner's Chemical Technology.* *Fall term, full study.* Professor PALMER.

*Required:* Chemistry, 1, 2, 3, 4, 5.

9. Organic Chemistry.—This course consists in a consideration of the principles and the processes of organic chemistry. The instruction comprises recitations, lectures, and laboratory practice. Berntsen's Organic Chemistry is employed as a text-book, and is supplemented by lectures upon special topics and by references to the works of Richter, Roscoe and Schorlemmer, and Beilstein. In the laboratory the practice consists in the preparation of organic compounds, in accordance with the directions given in the text-book, with selections from the manuals of Levy and Fischer. Some time is also devoted to ultimate organic analysis. *Winter and spring terms, full study.* Professor PALMER.

*Required:* Chemistry, 1, 2.

10. Sanitary, Medical and Medico-Legal Chemistry.—This course includes such subjects as the sanitary examination of potable and mineral waters, urinalysis, toxicology, etc. During this course also subjects for original work in course 11 must be canvassed and a choice of themes made by the Thanksgiving recess, after which time and until the Holidays the work is of such a nature as to familiarize the student with the special methods and processes involved in the research contemplated and also with the bibliography of the subject. *Fall term, full study.* Professor PALMER.

*Required:* Chemistry, 1, 2, 3, 4, 5, 9.

11. Investigations and Thesis.—In this research work the student is required to make full use of the various sets of chemical journals, English, French, and German, as an essential means of extending his acquaintance with chemical literature and a drill in consultation of works of reference. It includes also the preparation of a thesis according to the rules laid down under "Degrees."

Throughout the course are lectures, and discussions on theoretical and thermo-chemistry, and in the history of chemistry. *Winter and spring terms, full study.* Professors PALMER and PARR.

*Required:* Chemistry, 1-10.

12. Agricultural Chemistry.—This course is arranged for agricultural students who elect two years of chemistry. It occupies the whole of the second year and is principally made up of (a) chemistry, 5; (b) chemistry, 9, winter term; (c) chemistry, 7. *Fall, winter, and spring terms, full study.* Professors PALMER and PARR.

*Required:* Chemistry, 1, 2, 3, 4.

*Note.* Agricultural students who elect three years of chemistry must pursue the courses in order as indicated for regular chemical students.

13. Assaying.—For students in mining engineering. The course in assaying consists of instruction by lectures and from text-books upon the ores, fuels, fluxes, furnaces, reagents, and chargers used in the fire assay of gold, silver, and lead ores. The laboratory practice includes daily use of the crucible and muffle furnaces and the manipulations connected with fire assaying. The rapid wet assay of copper and zinc ores is given in close connection with the course in fire assaying. Same as assaying in Chemistry 6. *Winter term, full study.* Professor PALMER.

*Required:* Chemistry, 1, 3, 4.

14. Metallurgy.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. The known chemical reactions are expressed in equations; ore mixtures are calculated from analyses and experiments; and the size, construction, and working of furnaces are treated in accordance with modern practice. A series of models of furnaces and specimens of furnace material and products are used in illustration. The University is sufficiently near large and well conducted works smelting and refining iron, zinc, copper, silver, and lead for excursions to be made to them during the course. Instruction is given from text-books when possible, but great freedom in choosing material from later publications and from the present practice of actual plants is used in the supplementary lectures. *Greenwood's Steel and Iron; Peter's Modern American Methods of Copper Smelting.* *Spring term, full study.* Professor PARR.

*Required:* Chemistry, 1, 3, 4; Physics, 1.