805. Herbicide Action and Metabolism
Spring of even-numbered years. 2(2-0)
Properties and characteristics of herbicides. Processes involved in herbicide action, transport, and fate in plants and soils.
QA: CSS 805

823. Methods in Genetic Engineering of Plants
Fall of even-numbered years. 4(0-8) Interdepartmental with Horticulture and Forestry.
Bacterial transformation. Plant transformation via Ti-plasmid, protoplast/PEG, and electroporation methods. Detection of foreign gene integration and expression.

825. Clay Mineralogy and Soils Genesis
Spring of odd-numbered years. 4(3-2) Interdepartmental with Geological Sciences.
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Mineral structures. X-ray diffraction, pedogenic processes, and mineral transformations and stability.
QP: CSS 850, CSS 840, CSS 470 QA: CSS 825, CSS 870

827. Techniques in Cytogenetics
Fall of odd-numbered years. 1(0-3) Interdepartmental with Horticulture and Forestry.
Preparation of chromosomes from commercially important plants for cytogenetic analysis.

831. Soil and Plant Resources for Sustained World Food Production
Spring of even-numbered years. 3(3-0)
World food production capacities related to soil and climatic resources. Management and utilization of genetic resources for sustained production of human foods and animal feeds.
QA: CSS 831, CSS 480

840. Soil Physics
Fall of even-numbered years. 3(2-3)
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Physical properties of soil including texture, structure, consistency, aeration, moisture content, and temperature. Quantitative measurement of plant growth. Agronomic and engineering practices.
QA: CSS 840

850. Soil Chemistry
Spring. 3(3-3)
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Ion activities, ionic exchange and equilibrium reactions. Soil pH, macro- and micronutrients, saline soils and availability of nutrients to plants.
QP: CEM 383 QA: CSS 850

853. Plant Mineral Nutrition
Fall of odd-numbered years. 3(3-0) Interdepartmental with Horticulture.
P: BOT 301.
Inorganic ion transport in plant cells and tissues. Physiological responses and adaptation to problem soils. Genetic diversity in nutrient uptake and use by plants. Physiological roles of elemental nutrients in crop growth.
QP: BOT 301 QA: CSS 853

855. Interfacial Environmental Chemistry
Fall of even-numbered years. 4(4-0)
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Principles and mechanisms of reactions at solid-liquid interfaces emphasizing environmental chemistry. Sorption of ionic and organic compounds. Properties of colloids. Kinetics of surface reactions.
QA: CSS 812

865. Organic Chemistry of Soils
Spring of even-numbered years. 2(2-0)
Chemistry of natural and anthropogenic organic substances in soils.
QA: CSS 865

890. Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Individual study on field, laboratory, or library research.
QA: CSS 811

893. Selected Topics
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Selected topics in crop and soil sciences of current interest and importance.
QA: CSS 812

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to master's students in Crop and Soil Sciences.

QA: CSS 899

940. Advanced Soil Physics
Fall of odd-numbered years. 2(2-0)
P: CSS 840. R: Open only to graduate students in College of Agriculture and Natural Resources, College of Engineering, or College of Natural Science.
Modelling major physical transport mechanisms in the soil profile. Aeration, temperature and solute movement. Water movement and evaporation.
QP: CSS 840 QA: CSS 812

941. Quantitative Genetics in Plant Breeding
Spring of odd-numbered years. 3(3-0) Interdepartmental with Forestry and Horticulture.
P: CSS 450, STT 422.
Theoretical genetic basis of plant breeding with emphasis on traits exhibiting continuous variation. Classical and contemporary approaches to the study and manipulation of quantitative trait loci.
QA: CSS 941

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to doctoral students in Crop and Soil Sciences.

QA: CSS 999

EARTH SCIENCE ES

Department of Geological Sciences
College of Natural Science

445. Field Studies in Earth Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of department.
Field experience and techniques in geological sciences, meteorology, soil science, or oceanology.
QA: ES 445

446. Laboratory Investigations in Earth Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
P: ES 445 or concurrently. R: Approval of department.
Laboratory techniques and investagations in geological sciences, meteorology, soil science, or oceanology.
QP: ES 445 QA: ES 446

800. Special Problems in Earth Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of department.
Individual faculty directed study on topics in earth science.
QA: ES 800

ECONOMICS EC

Department of Economics
The Eli Broad College of Business and The Eli Broad Graduate School of Management

201. Introduction to Microeconomics
Fall, Spring, Summer. 3(3-0)
R: Not open to students with credit in EC 251H.
Economic institutions, reasoning and analysis. Consumption, production, determination of price and quantity in different markets. Income distribution, market structure and normative analysis.
QA: EC 201

202. Introduction to Macroeconomics
Fall, Spring, Summer. 3(3-0)
R: Not open to students with credit in EC 252H.
Determinants of Gross National Product, unemployment, inflation and economic growth. National income accounting and fiscal policy. Aggregate demand, supply management and monetary policy.
QA: EC 202

251H. Microeconomics and Public Policy
Fall, Spring. 4(4-0)
R: Open only to Honors College students. Not open to students with credit in EC 301.
Theories of consumer behavior, production and cost. Output and price determination in competition and monopolies. Welfare economics, general equilibrium, externalities, and public goods.
QA: EC 251H, EC 324

252H. Macroeconomics and Public Policy
Fall, Spring. 3(3-0)
P: EC 251H; or EC 201, EC 301. R: Open only to Honors College students. Not open to students with credit in EC 302.
Theory of national income, unemployment, inflation and economic growth and its application to economic analysis and policy.
QA: EC 252H or EC 326

301. Intermediate Microeconomics
Fall, Spring, Summer. 3(3-0)
P: EC 201, EC 202. Not open to students with credit in EC 251H.
Theories of consumer choice, production, cost, perfect competition, and monopoly. Welfare economics, general equilibrium, externalities and public goods.
QP: EC 201, EC 202 QA: EC 324

302. Intermediate Macroeconomics
Fall, Spring, Summer. 3(3-0)
P: EC 201, EC 202. R: Not open to students with credit in EC 252H.
National income accounting. Determination of aggregate output, employment, price level, and inflation rate. Policy implications.
QP: EC 201, EC 202 QA: EC 326

306. Comparative Economic Systems
Fall. 3(3-0)
P: EC 201 or EC 251H; EC 202 or EC 252H.
Characteristics and functions of economic systems. Alternative patterns of economic control, planning, and market structure. Theories, philosophies, and experiences associated with capitalism, socialism, and mixed economies.
QP: EC 201 or EC 251H, EC 202 or EC 252H QA: EC 434