

**IA 197. Energy Utilization and Instrumentation (3)**

Fundamental sources of energy; energy converters using direct mechanical force, external combustion, internal combustion, and electricity as energy sources; mechanical, thermal, and electrical instrumentation for industrial process indication and control.

**IA 199. Senior Problem in Industrial Technology (3)**

Prerequisite: senior standing in industrial technology. Approved problem or research project in the area of the student's option.

**GRADUATE COURSES**

(See *Course Numbering System—Definitions and Eligibility*)

**IA 224. Industrial Education Philosophy and History (2)**

Evolution, development, and present status of industrial education; industrial arts education and trade and industrial education; industrial arts in general education; developing, promoting, and improving a program of instruction in industrial arts.

**IA 270. Graduate Technical Problems in Industrial Arts (2-9; max total 9 if no area repeated)**

Technical work in selected areas; research under supervision of instructor.

**IA 280. Problems in Industrial Arts Research (2)**

Seminar in research procedures in the industrial arts; basic bibliography, research form and method.

**IA 284. Seminar in Industrial Arts (2-6; max total 6 on master's degree if no area repeated)**

Advanced study in different phases of industrial arts; recent developments and trends in the various design, drawing, and technical areas of industrial arts.

**IA 285. Planning Industrial Arts Facilities (2)**

Planning and organizing various types of school shops; architectural considerations, selection and specifications of equipment. Field trips.

**IA 286. Safety and Related Problems (2)**

Research and study of safety problems in industrial education; planning and evaluation of specific safety programs.

**IA 287. Planning and Organizing Industrial Arts Curriculum (2)**

Modern industrial arts curriculum; organization and management; recent trends concerned with equipment, supplies, content, safety, and methods.

**IA 288. Administration and Supervision of Industrial Arts (2)**

Policies and procedures in administration and supervision of industrial arts.

**IA 290. Independent Study (1-3; max see reference)**

See *Regulations and Procedures—Independent Study*.

**IA 299. Thesis or Project (2-4; max total 4)**

Prerequisite: see *Master's Degrees—Thesis Requirement*. Preparation, completion, and submission of an acceptable thesis or project for the master's degree.

**IN-SERVICE COURSES**

*Note: In-service courses (300 series) are not intended for use on degrees except by special, prior approval. See Extension and Summer Session Bulletins for course descriptions.*

**IA 341. Problems in Industrial Arts (2; max 6 if no area repeated)**