DAIRY SCIENCE (DSCI)

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DSCI Courses

DSCI 100. Enterprise Project. 1-4 units
CR/NC
Selection and completion of a management/production project under faculty supervision. Project participation is subject to approval by the project supervisor and the Cal Poly Corporation. Degree credit limited to 12 units. Credit/No Credit grading only.

DSCI 102. Dairy Operations and Safety. 2 units
Dairy farm biosecurity, animal handling and welfare, equipment operation, employee safety and hazard analysis. Instruction in standard operating procedures (SOP) relevant to milking, transition cow and calf management and cattle identification. 2 activities.

DSCI 200. Special Problems for Undergraduates. 1-2 units
Prerequisite: Consent of instructor.
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DSCI 202. Dairy Promotion and Marketing. 4 units
Prerequisite: DSCI 230 and DSCI 231.
National and state dairy promotional programs, advertising and merchandising. Marketing and pricing of milk and dairy products at the state and national level. 4 lectures.

DSCI 230. General Dairy Husbandry. 4 units
Selection, breeding, feeding, and management of dairy cattle. Composition and food value of dairy products. Milk pricing, political influences, dairy industry statistics and opportunities. Producing and handling products. Intended as introductory course for non-dairy science majors. 3 lectures, 1 laboratory.

DSCI 231. General Dairy Manufacturing. 4 units
Composition and properties of fluid milk and manufactured milk products. Chemistry and microbiology of dairy products. Processes and equipment involved in the manufacture of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. 3 lectures, 1 activity.

DSCI 233. Milk Processing and Inspection. 4 units
Prerequisite: DSCI 231, or FSN 125, or FSN 230.
Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. California dairy codes used for dairy farms and plants, with practice inspections of dairy farms and factories. 3 lectures, 1 laboratory.

DSCI 241. Dairy Cattle Selection, Breeds, Fitting and Showing. 4 units
Prerequisite: DSCI 230.
Selection of dairy cattle on type conformation and the correlation between type and production. Dairy cattle breeds and breed comparisons. Techniques to properly condition, groom and present dairy cattle for evaluation and merchandising. 2 lectures, 2 activities.

DSCI 270. Selected Topics. 1-4 units
Prerequisite: Open to undergraduate students and consent of instructor.
Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

DSCI 301. Dairy Cattle Nutrition. 4 units
Prerequisite: ASCI 220 with a grade of C- or better or consent of instructor.
Nutrition principles to maximize milk production. Ruminal/post ruminal digestion, post absorptive metabolism, nutrient interactions and microbiology. Use of computer models to evaluate and formulate diets. 3 lectures, 1 activity.

DSCI 321. Lactation Physiology. 4 units
Prerequisite: ASCI 220; DSCI 230; and BIO 111 or BIO 161.
Mechanisms of milk component secretion, including protein, lactose and fat metabolism. Disorders of the mammary gland (mastitis) and control strategies. Endocrine aspects of mammary gland development and lactogenesis. 4 lectures.

DSCI 330. Artificial Insemination and Embryo Biotechnology. 4 units
Prerequisite: ASCI 229 or DSCI 230.
Techniques in the collection, evaluation and processing of semen, along with embryo culturing and manipulation. Insemination procedures, fertility problems, record keeping, estrous synchronization, endocrine control of reproduction, treating reproductive disorders and embryo transfer. 3 lectures, 1 laboratory.

DSCI 333. Dairy Animal Health, Safety and Applied Technology. 4 units
Prerequisite: ASCI 220 and DSCI 230.
Application of principles of herd health, biosecurity, lactation physiology, cattle management and reproductive physiology to successful dairy operations. Assessment of animal comfort and general health and well-being. Practical techniques in safe animal handling. 3 lectures, 1 activity.

DSCI 339. Internship in Dairy Science. 1-12 units
CR/NC
Prerequisite: Consent of internship instructor.
Selected Dairy Science students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 12 units. Credit/No Credit grading only.

DSCI 400. Special Problems for Advanced Undergraduates. 1-2 units
Prerequisite: Consent of instructor.
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DSCI 401. Physical and Chemical Properties of Dairy Products. 4 units
Prerequisite: Junior standing. Recommended: CHEM 312.
Composition, structure and properties of milk and milk products. Physical and chemical changes that occur during processing and storage of dairy products. Objective measurement of chemical and physical properties. 3 lectures, 1 laboratory.
DSCI 402. Quality Assurance and Control of Dairy Products. 4 units
Prerequisite: DSCI 444 or MCRO 421.

Current methods used to evaluate dairy products with respect to plant economics and consumer safety. Accurate procedures for chemical and biological testing, statistical approach to sampling and design and interpretation of HACCP programs for assuring product quality and safety. 3 lectures, 1 laboratory.

DSCI 410. Advanced Dairy Nutrition. 4 units
Prerequisite: ASCI 229; and ASCI 355 or DSCI 301.

Nutrient metabolism and diet formulation technologies for all classes of dairy cattle; whole-farm feed management; physiological and nutritional aspects of predominant metabolic disorders; on-farm auditing and troubleshooting of nutritional management. Field trip required. 3 lectures, 1 laboratory.

DSCI 412. Dairy Farm Consultation. 4 units
Prerequisite: DSCI 333.

Student consultation teams of three or four students visit dairies and/or attend management training seminars followed by presenting management recommendations to the dairy owners, consultants, and other industry leaders. 1 seminar and supervised work.

DSCI 422. Breeding and Genetics of Dairy Cattle. 4 units
Prerequisite: DSCI 241, BIO 111 or higher, STAT 130 or higher.

Evaluation of inherited characteristics in dairy cattle, including principles of inheritance and genomic evaluations. Proving and selecting sires and dams, dairy genetic evaluations. 4 lectures.

DSCI 432. Advanced Dairy Herd Management. 4 units
Prerequisite: DSCI 333.

Dairy herd management skills needed in dairy operations. Instruction and lab experience in management, records, labor, waste management, and milking management. 4 lectures.

DSCI 433. Dairy Plant Management and Equipment. 4 units
Prerequisite: DSCI 233 or FSN 204.

Basic management principles applied to the dairy industry. Industrial organization and control. Dairy plant design, facilities, layout. Inventory control and records. Milk pooling and stabilization records. Maintenance and operation of equipment. 3 lectures, 1 laboratory.

DSCI 434. Cheese and Fermented Dairy Foods. 4 units
Prerequisite: DSCI 231; MCRO 221 or MCRO 224; and STAT 218. Recommended: CHEM 313.

Scientific methods, ingredients, and equipment used in the manufacture of various fermented dairy products, including cheeses, buttermilk, sour cream, and yogurt. 3 lectures, 1 laboratory.

DSCI 435. Concentration and Fractionation Technology. 4 units
Prerequisite: DSCI 233 or FSN 204.

Technology of evaporation, drying and membrane separation processes applied to dairy fluids. Design and performance of evaporators, driers, and membrane processing systems. Equipment, ingredients, and methods needed to manufacture butter and dairy spreads. 3 lectures, 1 laboratory.

DSCI 444. Dairy Microbiology. 4 units
Prerequisite: DSCI 233; and MCRO 221 or MCRO 224; and STAT 130 or STAT 218; or graduate standing.

Microorganisms involved in the fermentation and ripening processes in the dairy industry, as well as those involved in spoilage of milk and dairy products, in the transmission of disease through these products, and indicator systems used to determine sanitary quality of these products. 3 lectures, 1 laboratory.

DSCI 461. Senior Project. 3 units
Prerequisite: Junior standing.

Selection and completion of a project under faculty supervision. Projects are typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal written report. 2 lectures and supervised work.

DSCI 470. Selected Advanced Topics. 1-4 units
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

DSCI 471. Selected Advanced Laboratory. 1-4 units
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

DSCI 500. Individual Study in Dairy Science. 1-6 units
Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the Dairy Science faculty. Total credit limited to 6 units.

DSCI 501. Dairy Chemistry. 3 units
Prerequisite: CHEM 212 or CHEM 312; admission to Master of Professional Studies program in Dairy Products Technology. Recommended: Differential and Integral Calculus.

Composition, structure/functional relationships and properties of milk, milk components and products. Physical, chemical and biochemical changes that occur during processing, storage and use of milk and milk components. Chemical, physical, functional and nutritional properties of milk components. 3 lectures.

DSCI 502. Dairy Chemistry Laboratory. 2 units
Prerequisite: DSCI 501; admission to Master of Professional Studies program in Dairy Products Technology.

Objective measurements, analysis and isolation of milk components. Experimental demonstration of chemical and physical reactions of milk components during typical processing conditions. 2 laboratories.
**DSCI 510. Dairy Foods: Issues and Practices. 2 units**

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Contemporary issues in the dairy foods and allied industries. Consumer, political, environmental, regulatory, producer, technological, scientific, and economic considerations critical to future industry leaders. Required field trips to the dairy foods processing industry in California. 1 lecture, 1 activity.

**DSCI 520. Dairy Processing and Manufacturing I. 3 units**


Principles of unit operations involving heat and mass transfer including pasteurization and related thermal processes, centrifugal separation, concentration processes, churning and related high shear extrusion, fractionation processes, freezing, and drying technologies. Pneumatic and mechanical devices and systems. 2 lectures, 1 laboratory.

**DSCI 521. Dairy Processing and Manufacturing II. 4 units**

Prerequisite: DSCI 520; admission to Master of Professional Studies program in Dairy Products Technology.

Unit operations in process systems for the efficient manufacture of fluid milk products, cream, butter, and concentrated milk. Process variables and their control, system integration. Use of processes to manipulate physical and chemical properties to influence product quality. 3 lectures, 1 laboratory.

**DSCI 524. Dairy Processing and Manufacturing III. 4 units**

Prerequisite: DSCI 520 and admission to Master of Professional Studies program in Dairy Products Technology.

Unit operations in process systems for the manufacture of fermented milk, cheese, frozen desserts, and dried milk and whey products. 3 lectures, 1 laboratory.

**DSCI 535. Dairy Foods Ingredient Functionality. 4 units**

Prerequisite: DSCI 501 and admission to Master of Professional Studies program in Dairy Technology.

Physical, chemical, and sensory properties of functional milk components when used in food products. 3 lectures, 1 laboratory.

**DSCI 539. Graduate Internship in Dairy Science. 6 units**

CR/NC

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology and consent of instructor.

Practical work experience and management assignments in a dairy food processing company. Credit/No Credit grading only.

**DSCI 540. Graduate Dairy Microbiology. 4 units**

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology. Concurrent: DSCI 520. Recommended: MCRO 221 or equivalent.

Raw milk microbiological principles, pasteurization and microorganisms in dairy foods safety, microbiological analysis of dairy products, fermented milks and cheese, starters and probiotics, commercial practices and sources of information for regulation on microbial aspects of dairy foods. 2 lectures, 2 laboratories.

**DSCI 541. Quality Assurance, Quality Control and Food Safety. 4 units**

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Concepts and methodologies used in dairy industry and dairy food plants for assurance and control of the quality of finished product. Basis for understanding physical, chemical and microbiological methods as they apply to quality evaluation of dairy foods. 3 lectures, 1 laboratory.

**DSCI 560. Recent Developments in Dairy Science and Technology. 1-3 units**

Prerequisite: Senior or graduate standing and approval of instructor.

Presentation and critical review of current research publications. Methodological advances and applications in dairy food systems. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 to 3 seminars.

**DSCI 565. Industrial Plant Considerations for Sustainable Operation. 4 units**

Prerequisite: DSCI 520; admission to Master of Professional Studies program in Dairy Science Technology.

Plant site selection considerations, project management, plant design and layout, management of productivity maintenance, plant improvement project selection criteria, working with regulatory environment, community relations, and personal safety for overall industrial plant sustainability. 3 lectures, 1 activity.

**DSCI 570. Selected Topics in Dairy Science. 1-4 units**

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

**DSCI 571. Selected Advanced Laboratory in Dairy Science. 1-4 units**

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

**DSCI 581. Graduate Seminar in Dairy Science. 1-3 units**

CR/NC

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Current challenges in the field and their application to industry. Group study of industry issues. Current research findings as applied to production, leadership and marketing. Total credit limited to 3 units. Credit/No Credit grading only. 1 to 3 seminars.

**DSCI 582. Dairy Processing and Plant Management. 2 units**

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Dairy plant operation, processing experience and production team dynamics. Practical training and experience in dairy plant operations to allow efficient, safe and sanitary processing of dairy products manufacture in a team environment. Total credit limited to 4 units. 2 laboratories.
DSCI 585. Cooperative Education Experience in Dairy Science. 1-6 units
CR/NC
Prerequisite: Graduate standing and consent of instructor.

Advanced study, analysis and part-time work experience in the field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

DSCI 599. Thesis in Dairy Science. 1-9 units
Prerequisite: Graduate standing.

Systematic research of a significant problem in Dairy Science. Problem identification, significance, methods, data analysis, and conclusion. Enrollment required every quarter in which facilities are used or advising is received. Total credit limited to 9 units.