

Academic Plan

Department of Nutrition

College of Agricultural and Environmental
Sciences

University of California

Davis, California

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Context for Planning

The Department of Nutrition is strategically positioned to play a key role in the future of the College of Agricultural and Environmental Sciences and the campus. It is central to an emerging area of research described in the College's Academic and Strategic Plan: "Food for Health and Food Safety". In addition to collaborative programs with the Western Human Nutrition Research Center and the National Center of Excellence in Nutritional Genomics, we anticipate new opportunities with the establishment of the School of Nursing and the proposed School of Public Health. Research in this area will provide an understanding of the relationships among nutrition, health, and gene expression and can lead to the development of diets that are best suited to an individual's genetic make up, lifestyle and age. Tailored nutrition throughout a person's lifetime will make it possible to optimize health and improve an individual's quality of life. Research in the molecular basis of obesity, Type 2 diabetes and cardiovascular diseases will lead to new methods of treatment and prevention for these major public health epidemics and diseases. Nutritionists are uniquely qualified to identify how genes respond to specific nutrients in food, and how to incorporate nutrients into new foods to enhance health. Research in international and community nutrition will develop and enhance approaches to achieve normal growth and development of children in emerging nations and underserved communities in the United States. Nutrition education and evaluation research is helping identify new ways to communicate healthful food and lifestyle choices to children and diverse populations, leading to improved diet and health. In addition to improving the quality of life, nutrition research has important economic implications. Enhanced health through disease prevention will reduce health care costs, a major challenge to our society.

The Department provides an opportunity for a growing number of undergraduate students to major in Nutritional Sciences and Clinical Nutrition (see Figure 1 and Table II). These fields provide important employment opportunities for rewarding careers that contribute to the public good. The Department offers General Education courses that the students rate as among the best on campus. The graduate program in Nutritional Biology, the Designated Emphasis in International and Community Nutrition and the Masters of Advanced Studies in Maternal and Child Nutrition prepare the next generation of professionals, faculty, researchers, and policy makers.

Faculty in the Department of Nutrition display high levels of expertise and provide professional leadership within the discipline at multiple levels. Research results play a major role in the development of state, national, and international food and nutrition policy and support the Expanded Food and Nutrition Education Program and the Food Stamp Nutrition Program. Research, education, and engagement in nutrition lead to better diets for improved health that can significantly reduce health care costs.

Research

Departmental Specialization and Core Competencies

- Developmental nutrition, with an emphasis on the acute and persistent effects of diet during prenatal and early postnatal development
- Clinical human research and animal models of nutrition-related diseases, with an emphasis on obesity and age-related chronic diseases including diabetes, cancer, osteoporosis, and cardiovascular disease
- International and community nutrition with an emphasis on maternal and child health and development in disadvantaged populations in the U.S. and emerging nations
- Metabolism and nutritional toxicity (both at the molecular and cellular levels), with an emphasis on essential minerals and vitamins and phytochemicals from natural foods and products
- Nutrition education in schools, communities, and in support of USDA's food assistance and education programs.

The Research Agenda

Developmental nutrition, the commitment to the Program in International and Community Nutrition (PICN), and studies important to our understanding of how nutrients affect basic biological functions and disease processes will continue as major research focus areas. Increasing emphasis will be directed toward understanding dietary effects on health and disease development, in particular the varying nutrient responses within individuals as a function of age and across individuals as functions of genotype and lifestyle. Conditions or disease states of particular interest to nutrition include obesity, diabetes, osteoporosis, neurodegenerative syndromes and vascular disease. Given current advances in the field, and the faculty currently being recruited in association with the Foods for Health Initiative, we envision that research in metabolomics, proteomics, and toxicogenomics will be increasingly developed and used by our faculty. Additional emphasis will be given to the biological and biochemical roles of nutrients that benefit health and how they may be delivered in foods.

Extramural Grants and Gifts

With the decrease in state funding for research, extramural grants and gifts have become critically important to support the research program. For the past two

decades the Department of Nutrition has consistently ranked among the top of departments within CAES with respect to extramural funding (both gifts and grants). In 2006-2007 the Department ranked third in the College in terms of Direct Cost Expenditures (\$10,377,608) and second when expressed as Direct Cost Expenditures per FTE (\$830,209). Even with increased competition for extramural funding, the Department has increased Direct Cost Expenditures as shown in Table I. The impact of the Food Stamp Nutrition Education Program (FSNEP) audit upon the Department's research program has yet to be determined.

TABLE I
DEPARTMENT OF NUTRITION
DIRECT COST EXPENDITURES
2004 - 2007

	2004-05	2005-06	2006-07
Research	\$8,858,583	\$9,684,085	\$10,377,608

A current goal in the Department is that all faculty should have, on average, two major competitive grants. A goal for the Department is that the average grant support (Federal, State and Industry) per FTE by 2010 should be a minimum of \$500,000/year. To help meet this goal, the Department is dedicated to the development and maintenance of critical common-use core facilities that enhance the competitiveness of our individual grants. Another key goal in the Department is the provision of an infrastructure that supports the development of program projects; this is particularly essential for campus initiatives, such as the Foods for Health Initiative.

Undergraduate Education

The importance of proper nutrition to well-being of the population, in terms of reducing risk of disease and maintaining health, is now unquestionable. Several investigations have linked certain types of dietary fat, excess calories, and other nutritional imbalances directly to an increased risk for the development of cardiovascular disease, certain types of cancer, and diabetes.

Moreover, recent reports strongly suggest that chemical characteristics of individual compounds found in food, e.g., the antioxidant properties of vitamins E and C may protect individuals from developing disease.

These scientific findings are often used by untrained individuals to promote sales of nutritional aids and supplements that have little or no value to health.

It is essential that the future leaders of California have at least a basic understanding of the scientific basis of nutrition in order to decrease misinformation concerning nutrition and prevent the establishment of inappropriate public policy. For these reasons we believe that it is the responsibility of the University of California to provide its students with access to courses that teach the basic elements of nutritional science.

Department of Nutrition Majors

Two majors are offered by the Department – Clinical Nutrition and Nutrition Science

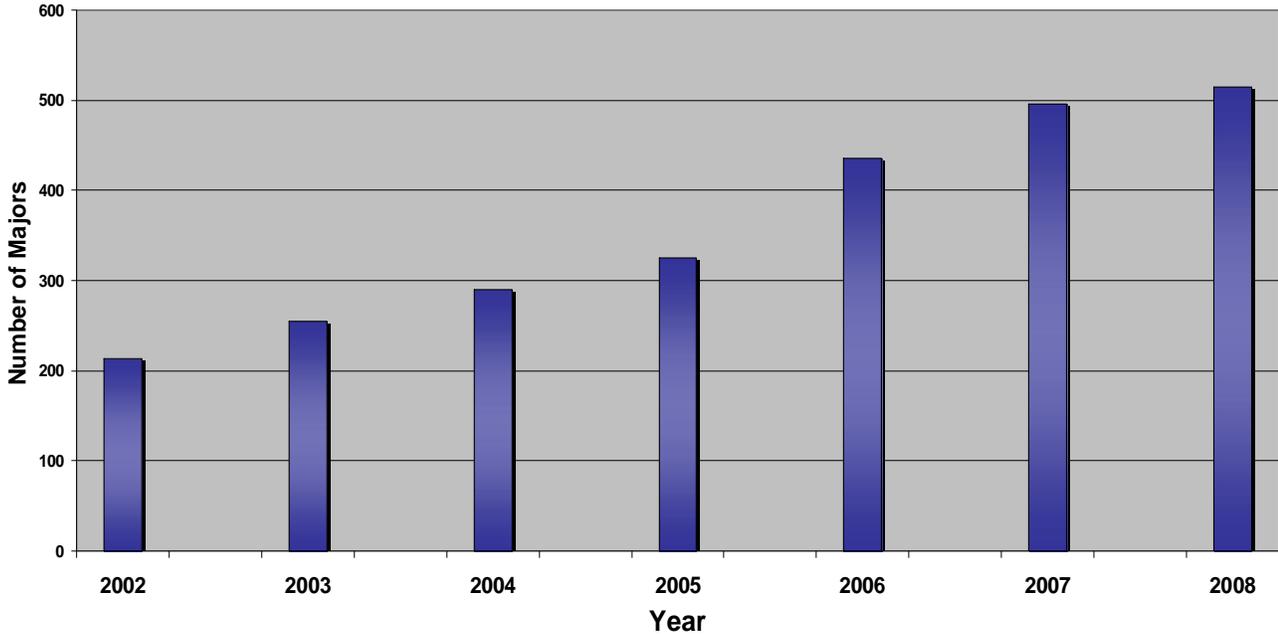
1. **Clinical Nutrition:** This major is ideal for students who wish to apply physical, biological and social sciences, food service management and education to the advancement of public health. The Clinical Nutrition Major at UC Davis is widely regarded as one of the nation's premier programs in Dietetics. The success rate of UC Davis students passing the licensure exam required to become a Registered Dietitian (R.D.) is among the highest in the nation. Of all students graduating in Clinical Nutrition who have elected to become R.D.s, greater than 90% are successful. Thirty-five % of the Clinical Nutrition Majors enter graduate school. A site visit by the Commission on Accreditation for Dietetics Education in February 2008 gave high acclaim to the program; no deficiencies were identified. Although a majority of students in Clinical Nutrition select the major to become R.D.s, there is a growing number who see this course of study as excellent preparation for post-graduate education in the medical sciences. Many Clinical Nutrition graduates continue their education at schools of public health, medicine, nursing, and physical therapy.
2. **Nutrition Science:** This major attracts students who wish to specialize in the laboratory science or community aspects of Nutrition. The major encompasses all aspects of the consumption and utilization of food and its constituents. There are two options in the major: The Nutritional Biochemistry option emphasizes the biochemical and physiological aspects of nutrition. The Community Nutrition option emphasizes the social and public health aspects of nutrition.

The Nutrition Science Major is excellent preparation for technical work in the field of nutrition in humans, animals, food and pharmaceutical industries. It also provides a strong background in technical writing and health education. Students who wish to continue their studies are well prepared for professional study in nutrition, medicine, and other health sciences.

As shown in Figure 1 and Table II, student interest in the Clinical Nutrition and Nutrition Science majors has more than doubled in the past six years.

**Number of Undergraduate Major
Clinical Nutrition & Nutrition Science
2002 - 2008**

Figure 1



**TABLE II
NUMBER OF MAJORS***

YEAR	CLINICAL NUTRITION	NUTRITION SCIENCE	TOTAL
2002	105	109	214
2003	130	125	255
2004	146	144	290
2005	169	156	325
2006	222	214	436
2007	261	235	496
2008	293	222	515

* Fall term enrollment

General Education and Non-Majors Courses

Currently, the Department offers seven General Education courses in the Science and Engineering and Sociology breadth areas. One of the courses, “Discoveries and Concepts in Nutrition” (Nutrition 10), has been voted by the students as the best General Education Course on campus in 2008 and was first runner-up in 2007. Over **2,000** students enroll in the course each year. Nutrition 11, “Current Topics and Controversies in Nutrition” averages over **500** students annually. Both courses experience a wait list that often exceeds 20% of the enrollment numbers.

E-Learning

Faculty in the Department of Nutrition have developed two courses that rely heavily on information technology to enhance the learning process. Nutrition 10 provides undergraduate students with education in functions of nutrients in food; basic elements of digestion and absorption; whole body metabolism; and the relationship between nutrition and disease. Dr. Applegate has developed e-learning components that supplement her instruction with interactive animations delivered during lecture and an interactive web site. For example, enhancement of learning is achieved by on-line review quizzes. These quizzes question the student on the course notes and reading material and provide immediate feedback on the correct answers and where to find the information in the lecture notes and reading.

The second course, Nutrition 111AV, “Introduction to Nutrition and Metabolism”, is a self-contained, interactive, computer-based teaching (CBT) course developed by Dr. Roger McDonald. This entirely online course is composed of nine independent, multimedia modules that contain animation, text, voice, self-evaluation, authentication schemes, and background database interaction. Nutrition 111AV provides students with an enhanced learning experience in which complex scientific concepts are visualized in modules that students can review at their own pace. Nutrition 111AV is now completing its sixth year of instruction at UC Davis and has an enrollment of over 200 students per year. It draws students from the Colleges of Agricultural and Environmental Sciences, Biological Science, Engineering, Letters and Science, Medicine, and the Graduate Division.

Plans for the Future

The department Curriculum Committee is currently conducting a review of the curriculum, including the course load (student-faculty ratio) for each faculty member and anticipated changes due to recent and upcoming retirements. We will use this information to guide revisions to the course offerings, with the objective of maintaining coverage of core topics and strengthening coverage of topics (such as nutrition and exercise science) that are not currently well-represented in the courses for nutrition majors.

We also are considering restructuring the sequence of courses so that nutrition majors can take some of them sooner than is currently possible given the sequence of prerequisites. Lastly, we wish to further incorporate methods of course delivery that foster a high-quality learning experience in large-enrollment classes.

Graduate Education

The Nutritional Biology Graduate Group

Graduate degrees in Nutrition are offered by the Graduate Group in Nutritional Biology. The Graduate Group is a cooperative interdepartmental organization of more than 73 faculty from 17 departments in three colleges (Agricultural and Environmental Sciences, Letters and Science, and Biological Science) and two professional schools (Medicine and Veterinary Medicine) chaired by Dr. MRC Greenwood and currently housed in the Department of Nutrition. A student may pursue an M.S. or Ph.D. degree in Nutritional Biology while studying under the direction of any member of the Graduate Group.

The great diversity of research interests represented by faculty members allows students to choose from a wide variety of themes. Areas of strength within the program include nutritional biochemistry, animal nutrition, nutrition and development, nutrient bioavailability, human/clinical nutrition, nutrition and behavior, nutritional energetics, community nutrition, maternal and child nutrition, nutrition and endocrinology, international nutrition, obesity/body composition, physiology of digestion, nutrition and chronic disease, culture and nutrition, nutrition and gene expression, nutrition and aging, nutrition and immunity, diet and exercise, dietary assessment, protein and lipid metabolism, food intake regulation and nutrition education. If they wish, doctoral students in nutritional biology can choose to be admitted into the Designated Emphasis in International Nutrition or the Designated Emphasis in Biotechnology.

The Master of Advanced Study in Maternal and Child Nutrition

This program is offered by the UC Davis Department of Nutrition, in Collaboration with UC Davis Extension.

During the last decade, the need for nutrition specialists in public health and maternal and child health programs has increased, along with the recognition that low birth weight, diabetes, and childhood overweight and obesity are important national health concerns.

There is also an increasing demand for lactation consultants, as greater numbers of women choose to breastfeed their infants. In response, private and public health agencies have focused on improving the nutrition of mothers and children.

The UC Davis Master of Advanced Study in Maternal and Child Nutrition Program is designed to provide a strong scientific background in these topics, and to train professionals to design, implement, and evaluate nutrition intervention programs for mothers and children from a wide variety of cultural, ethnic, and social backgrounds.

Outreach/Cooperative Extension

Consistent with university expectations, Nutrition faculty participate in scientific meetings, professional societies and expert committees as well as teaching at the undergraduate and graduate level. The Department of Nutrition is committed to extending science-based information to the public through local, state, national, and international channels and has played key roles in developing nutrition and science policy at all levels of government, as described below.

Nutrition-related problems facing communities are addressed through scientific inquiry. Department research activities address both basic and applied research questions. This research ranges from studies on gene-nutrient interactions to more applied questions that directly focus on community health issues. The basic-to-applied research continuum is an integral principle governing the Department's research program and influences the strategy used in requesting positions as described in the "Faculty" section of this plan. An important message that we strive to communicate to the public and our constituents is that research conducted at a basic level should be used to help formulate policies and nutrition recommendations, and to provide guidance to improve the health and nutritional status of the individual and populations. Issues of public interest are raised through interactions among faculty (including CE specialists); the professional health community; local, state, national and international agencies; industry; and the general public. The research agenda is diverse and includes such topics as Dietary Patterns and Nutritional Status of Vietnamese and Vietnamese-Americans, Impact of Dietary Intervention on Cardiovascular Disease Risk, and Estimation of Vitamin A Requirements of Adult Males. Findings from randomized clinical trials conducted by members of our Department have been used by the World Health Organization (WHO) to formulate global child feeding recommendations and new growth standards. New methodologies for the elucidation of metabolic pathways and detection of nutrients such as vitamin B12, vitamin A, and folate are being developed through basic research in the Department; results from these studies will allow early detection and interventions for high risk groups. Similarly, innovative fortification programs are being examined through international research conducted by several Department members; results from these studies can be extended to health professionals as a means of improving the nutritional status of high risk groups in the US.

A significant component of the Department's outreach program is to critically evaluate scientific information and translate it into messages that are disseminated to health professionals and various agencies. Examples of such translational activities include short courses, seminars, and workshops intended to update nutrition knowledge among professionals at the state or national level; newsletters; and development of curricula for use by para-professionals and educators. An additional component of our outreach activities is formulating and reviewing guidelines, beyond what is considered normal for "professional service/competence". The following are examples: establishing Dietary Guidelines for the U.S. (USDA and HHS); drafting a new Infant Formula Act, the basis for regulation of the industry (FDA/Life Sciences Research Organization, LSRO); drafting nutrition competencies for the California Department of Education, providing nutrition expectations for children in grades K through 12; developing and validating measurement tools for use by USDA's food assistance and education programs in the US; revision of the food packages provided by the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and providing information and establishing infant feeding guidelines and supplementation/fortification strategies for developing countries (WHO). The Program in International and Community Nutrition faculty provide technical assistance and outreach to a number of other international agencies for the purposes of planning and implementing nutrition policies and programs in low-income countries (WHO, UNICEF, PAHO, FAO, USAID). A goal of the Department is to provide information that consistently has high impact. In certain circumstances, these activities have resulted in the guidance of new legislation. For example, departmental faculty played a leadership role in successfully completing a Blueprint for a Coordinated Food and Nutrition Policy for California. The main points of the Blueprint were crafted into a Resolution (ACR 58) that passed through the California State Assembly and the Senate.

Plans for the Future

The department plans to maintain its very high visibility in outreach, Cooperative Extension and professional service activities. Because of the age demographics of the department, many faculty members are currently at their peak level of state, national and international involvement in such activities. It is essential to bring in younger faculty members so that this tradition of outreach can be maintained during the next 5-10 years, when a significant proportion of current faculty members will retire.

Faculty

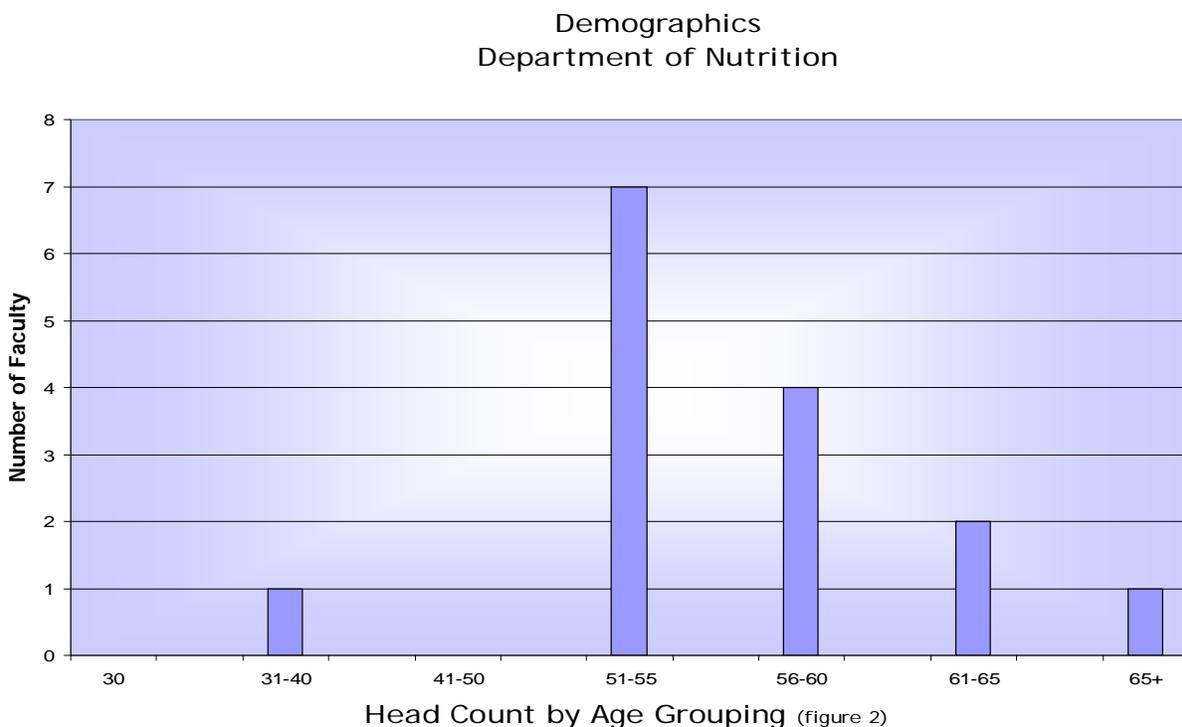
The Department currently consists of twelve Academic Senate faculty, two Lecturers, and four CE Specialists. Five Senate faculty members have joint appointments – two with Environmental Toxicology and three have Adjunct appointments in the School of Medicine.

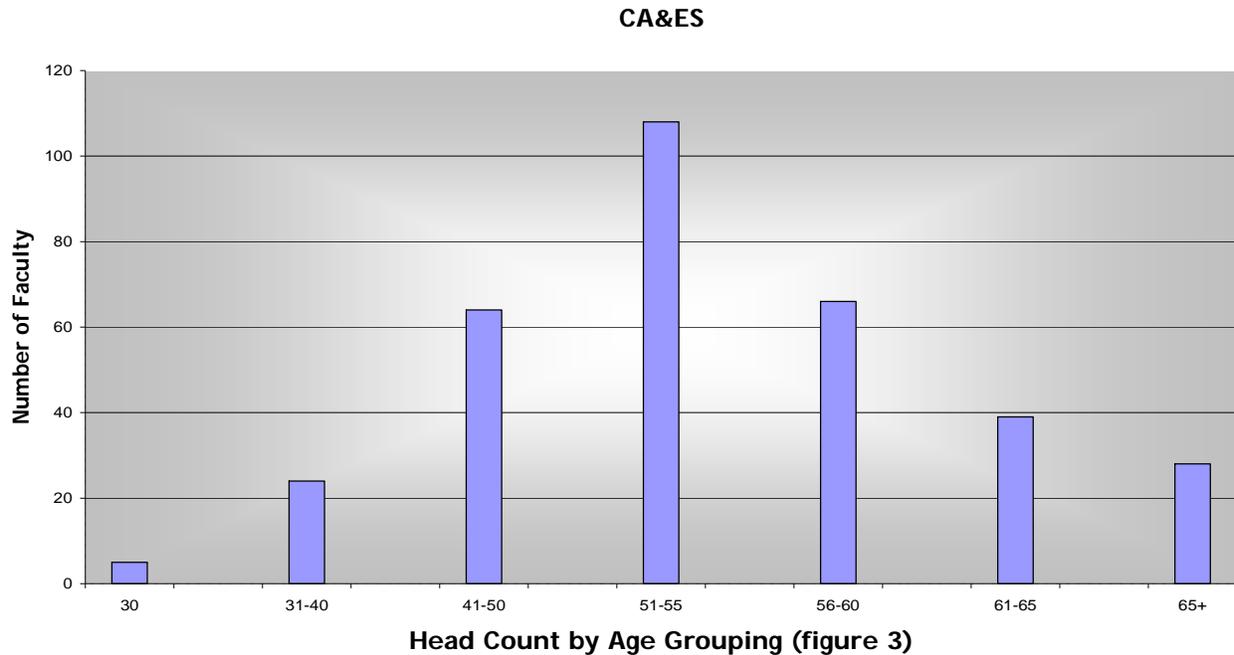
Two of the CE Specialists are associated with the Expanded Food and Nutrition Education Program (EFNEP) There is one academic coordinator who is Director of

EFNEP. In addition to the above Senate and CE faculty, 11 Research Faculty (individuals who are fully supported on extramural grants) are housed in, or associated with, the Department. There are 11 Adjunct Professors (one School of Veterinary Medicine faculty member and 10 USDA Western Human Nutrition Research Center scientists) in the Department. The Department is participating in the recruitment of two metabolomics positions in association with the Foods for Health Initiative (FFHI). One is a joint position with Food Science and Technology focusing on metabolic regulation, and the second is a joint position with Environmental Toxicology with a research emphasis on nutritional toxicology and metabolomics. These faculty members will have a 60% appointment in Nutrition and 40% appointment in Food Science and Technology or Environmental Toxicology, respectively. A third FFHI position, in which the Department will hold a 20% appointment, is a Quantitative Systems Biologist in the Department of Biomedical Engineering; this position emphasizes development of quantitative methods and their application to the integrated modeling of metabolism and underlying molecular mechanisms.

Positions Needed to Achieve and Maintain Research, Teaching, and Extension Goals

The demographics of the Department of Nutrition and the College of Agriculture and Environmental Sciences are shown in Figures 2 and 3.





Head Count of ladder faculty based on 10/2007 payroll data

We anticipate that there will be four to six retirements among the Nutrition Department Academic Senate faculty over the next five years. Figure 2 illustrates that we have only one faculty member under the age of 51. It is clear that in order to maintain the excellence of the Department and to be able to take advantage of the new opportunities in nutrition research, teaching, and outreach, there is a serious need to recruit junior faculty members.

We must simultaneously consider the need to recruit faculty with the skills and vision that are required for tomorrow's science, such as the metabolomics positions described above, and we need to replace critical faculty skills and programs that have been and/or will be lost through retirement. A high priority for the Department is the recruitment of one or more faculty members whose area of specialization is population-based human nutrition research in order to meet the teaching needs of the Department and to maintain a critical mass of core faculty for the Program in International and Community Nutrition. It is essential to bring in young faculty members who can carry on the training, research and public service missions that focus on nutrition problems of low-income countries and disadvantaged populations within the US.

An additional critical need is the recruitment of faculty qualified in Dietetics and who will contribute to the specialized teaching needs within the Clinical Nutrition major. Due to the large student growth in the major, the department is unable to meet the curriculum needs without additional staff. A high priority request is the hiring of a part-time lecturer to meet the immediate need for assistance in teaching dietetics

courses. A longer-term solution will need to be considered through regular faculty recruitments and simultaneous consideration of the research priorities of the department.

Another important priority will be the recruitment of at least one faculty member in the area of obesity with a particular emphasis on the identification of specific biological mechanisms and/or genomic profiles that account for altered states of metabolism.

Projected Resource Needs and Strategies for Achieving Our Goals

Sustaining the Meyer Hall Vivarium at USDA and NIH standards and expectations is essential to our mission of basic research. A 2007-08 one-time Hatch grant will be used to refurbish the tunnel and rack washer and upgrade the surgical suite. The Vivarium serves the Departments of Nutrition and Environmental Toxicology.

Work will continue on developing a metabolomics core laboratory for our Human Nutrition Research Facility (the Ragle Facility). Upgrading the laboratories in the Willow Cottage will be necessary for the two FFHI metabolomics faculty positions currently being recruited. Continued support for campus instrumentation centers is also critical for our research efforts.