

Additional Information for Agenda Item G-1

**Colorado State University –
Ph.D. Human Bioenergetics
Department of Health and Exercise Science
College of Applied Human Sciences**

1. Brief Overview of Proposed Program

Description of Academic Area: Bioenergetics is the multidisciplinary study of processes of energy transfer and conversion in cells, tissues, and organisms. Energy transfer is the *sine qua non* of all living systems; it virtually defines “living”. The regulation of energy transfer pathways/processes is a fundamental requirement for healthy living. Energy transfer processes underlie the conversion of foods to chemical energy, and accordingly relate directly to human nutrition, body weight regulation and energy balance. Further, dysregulation in bioenergetics can contribute to chronic diseases such as obesity, diabetes, cardiovascular disease, and cancer. Importantly, bioenergetic processes/pathways also underlie the conversion of stored nutrients and chemical energy into work. This work can include cellular processes such as ion and metabolite fluxes, biosynthetic pathways, DNA repair and the like, but is also manifested in muscle contractions. The energetics of muscle contraction impact cardiac, smooth, and skeletal muscle function, and thereby contribute directly to cardiovascular function, the regulation of blood flow and blood pressure, and aspects of physical activity such as power, endurance, balance, gait, and the maintenance of neuromuscular function across the lifespan. Given the foregoing, it is clear that the study of Human Bioenergetics has **direct practical applications** to the study of both healthy and diseased populations across a broad range of both age and functional capacities.

Rationale: The public health burden associated with chronic disease is enormous. Cost estimates related to diabetes and cardiovascular disease alone exceeds \$400 billion annually, *and continues to increase*. Research on pathogenesis, prevention, and treatment of diseases such as diabetes, the family of cardiovascular diseases, cancer, obesity, pulmonary disorders, and related chronic diseases is a multidisciplinary effort. Clinicians and basic scientists, in industry, academia, and health care settings, approach this challenge in a variety of ways. As is often the case, there is typically little cross-disciplinary communication, resulting in a compartmentalized approach to chronic disease. The aim of this Ph.D. program is to train students in integrative aspects of Human Bioenergetics that contribute to the maintenance of healthy lifestyles and the prevention of chronic disease. Such a program is designed to have a direct practical impact on health and economic issues which presently confront both the state of Colorado and the nation.

The Department of Health and Exercise Science (HES) at Colorado State has a long history of quality graduate education. The recruitment of new faculty and addition of new **research** facilities since 1996 has enhanced the ability of department faculty to train graduate students. Moreover, HES faculty have chaired or are currently chairing a total of 9 doctoral students from other CSU departments (e.g. Biomedical Sciences, Food Science and Human Nutrition, Mechanical Engineering). This demonstrates both the capacity for and commitment to training doctoral students, as HES faculty have provided the extramural financial support for these trainees. Ongoing efforts by the department to offer the highest quality education, research, and outreach opportunities to all students (undergraduate and graduate) have led to the conclusion that a primary departmental aim is to serve the need for highly trained academicians and scientists who are capable of meeting the growing national need, as most recently reflected in Healthy People 2010, for research and education

on human health and chronic disease by creating a unique graduate program to appropriately train graduate students for the doctor of philosophy degree (Ph.D.).

**Expected total number of students enrolled in program (five years post-implementation):
15 – 18 full-time**

2. Fit with CSU Role and Mission and University's Most Current Strategic Plan

- **What are the objectives of the program?**
 - Provide state-of-the-art training and experience in basic and applied human bioenergetics with a focus on physical activity, nutrition, and behavioral change as tools to reduce/prevent the risk for and expression of chronic disease (e.g.: heart disease, hypertension and stroke, obesity, type II diabetes, and frailty associated with aging) .
 - Develop in students both the theoretical knowledge and the experimental skills to carry out both laboratory and field based physiological and interventional studies on healthy and diseased human subjects. In support of this objective, students may be trained in the use of animal models of human chronic disease. As always, discoveries in animal models are intended to serve as a basis for developing a better understanding of *human* disease. Accordingly, translation of such animal research to human populations will be a primary objective of the proposed Ph.D. in Human Bioenergetics.
 - Develop in students an integrative and multidisciplinary approach to human bioenergetics, health, disease prevention and rehabilitation issues, from the molecular to the integrative control level.
- **How does the proposed program support the mission of the University? Refer to State Statute defining role and mission of Colorado State University.**

COLORADO STATE UNIVERSITY

23-31-101. University established - role and mission.

There is hereby established a university at Fort Collins to be known as Colorado State University shall be a **comprehensive graduate research** university with high admission standards offering a comprehensive array of undergraduate programs consistent with the tradition of land grant universities. The Colorado commission on higher education shall, after consultation with the board of governors of the Colorado State University system, further define the role and mission of the institution and establish as great a distinction among the graduate offerings at the Boulder campus of the University of Colorado, Colorado State University, and the University of Northern Colorado as in its judgment educationally, geographically, and economically appropriate. The governing board shall adhere to this further definition of role and mission. Colorado State University has the responsibility on a statewide basis utilizing when possible and appropriate the faculty and facilities of other educational institutions, those graduate level programs designated by the commission as primarily its statewide responsibility. The commission shall include in its funding recommendations a level of general fund support for these programs.

The **role and mission** of Colorado State University as articulated above requires that the University be a comprehensive graduate research university. Further, the Board of Governors of the Colorado State University system have the authority and responsibility to establish as great a distinction among the graduate offerings at the University of Colorado, Colorado State University, and the University of Northern Colorado as in its judgment is educationally, geographically, and

economically appropriate. The proposed Ph.D. program in Human Bioenergetics complements Ph.D. programs at these sister institutions by offering distinctive training in the integrated aspects of energy transfer processes which underlie human chronic disease. As will be articulated in more detail throughout the proposal, the program directly addresses regional and national public health and economic issues related to the chronic disease. Given this, we believe that the proposed Ph.D. program in Human Bioenergetics speaks directly to the role and mission of Colorado State University.

University Mission Statement

“By statute, Colorado State University is a comprehensive graduate research university with selective admission standards. Charged with offering a comprehensive array of baccalaureate, master’s and doctoral programs, it holds exclusive statewide authority for programs in agriculture, forestry, natural resources and veterinary medicine.”

“Colorado State University has a unique mission in the state of Colorado. The land-grant concept of a balanced program of teaching, research, extension, and public service provides the foundation for the University teaching and research programs, Agricultural Experiment Station, Cooperative Extension and Colorado State Forest Service. The University has long been a leader in recognizing the rapidly changing global environment and has a commitment to excellence in international education in all its instruction, research and outreach programs. The University continues to make education and training accessible to deserving applicants from all classes and groups and maintains a wide range of research, extension, and public service programs in response to the needs of the people of Colorado, the nation and the world.”

December 2, 2002 revision, which combined CRS Sect. 23-31-101 and CCHE Policy role and mission.

CSU Mission: Strategic Plan – Spring 2006

Inspired by its land-grant heritage, Colorado State University is committed to excellence, setting the standard for public research universities in teaching, research, service and extension for the benefit of the citizens of Colorado, and the United States, and the world.

By statute, CSU is a **comprehensive graduate university**, charged with offering a comprehensive array of baccalaureate, masters and doctoral programs. CSU has a **unique mission** within the State of Colorado, as the land-grant concept drives a balanced aim of integrating teaching, research, and outreach. The proposed program in Human Bioenergetics builds upon well-established research, education, and outreach programs within the Department of Health and Exercise Science and collaborating units.

- **How does the proposed program support the most current University Strategic Plan of the institution? How does the program contribute to attaining long-term goals and directions of the institution and department/unit?**

As articulated by President Penley in his inaugural address (4/22/2004), **health and well being** represents a “*great global challenge*”; and constitutes a primary aim of the promise to “*match the capabilities of Colorado State University to the great global challenges of our time, achieving world class status in research and*

scholarship while serving Colorado.” The new University Strategic Plan (2006-2015) states:

Enhance the quality and role of graduate education:

Goal 10 - Graduate Degree Programs. Refine existing and selectively create new graduate degree programs consistent with the institution’s strengths and demands of society. *The proposed Ph.D. in Bioenergetics represents an interdisciplinary effort to train students in cutting edge theory and practice related to the prevention and treatment of chronic disease. Such a program fits well with existing institutional strengths, and addresses the enormous public health burden imposed by chronic diseases such as obesity, diabetes, cardiovascular disease, and sedentary aging.*

Goal 11 - Graduate Enrollment. Increase the number of graduate students on campus, including international students. *While the PhD in Bioenergetics has not been developed merely to contribute to increased graduate enrollment, a rigorous PhD program can clearly help meet this aim.*

Foster excellence in research, scholarship, and creative artistry.

Goal 17 - Achievement in Research and Scholarship. Increase the quantity and quality of faculty research publications, proposals, artistic and cultural performances to levels commensurate with peer institutions. *The proposed PhD in Bioenergetics has enormous potential to increase scholarly productivity across multiple departments. HES faculty have been able to maintain high productivity in the absence of the ability to recruit and train PhD students, and such a program will clearly enhance the training, research, and publication potential for HES faculty and collaborators across the CSU campus.*

Goal 18 - External Funding. Increase externally funded research. *The faculty in HES presently hold > \$2.3 million dollars in extramurally funded research, and the potential for continued growth in extramural funding is enormous. The development of a rigorous and internationally recognized PhD program will make department faculty more competitive in terms of seeking extramural support for trainees.*

Focus research in areas of institutional strengths and societal needs.

Goal 22 – Superclusters. Encourage synergy, facilitate collaborative and cooperative efforts among scholars with interests in common problems, and promote CSU’s areas of excellence. *The PhD program in Bioenergetics fits well within the framework of the supercluster emphasis. Ongoing collaborations with multiple departments include the Metabolomics AEP, and ongoing discussions regarding a response to the Supercluster RFP. Synergy already exists across multiple departments, and the PhD program will serve to enhance such activities.*

Goal 23 – Issues-based research. Encourage scholarship that addresses pressing social, political, economic and cultural issues, both domestic and international. *The PhD in bioenergetics addresses high visibility public health issues that are cross-cultural, and that have tremendous economic implications (Annual health care costs from cardiovascular disease ALONE are approaching \$400 billion). The faculty have a consistent record of funding and scholarly publications addressing the pathogenesis and treatment of several prominent chronic diseases, aging, and ethnic differences in disease risk.*

Summary The proposed Ph.D. in Human Bioenergetics **directly** addresses the global challenge of health and well being and is designed to produce graduates who will have a *direct practical impact* on the health of the citizens of Colorado and the nation. The program directly addresses the goals listed above regarding graduate education and research aspects of the new strategic plan which envision greater interdisciplinary research and Ph.D. training. Thus, the program is well-positioned to serve both the university strategic plan and the university's unique land-grant mission.

- **How does the proposed program meet the needs of Colorado and enhance the state's capacity to respond effectively to social, economic, and environmental challenges and opportunities?**

While the state of Colorado continues to have the distinction of being the leanest state in the US, the prevalence of obesity is also rising within our state (less than 10% of Coloradoans were classified as "obese" in 1991, while 15-19% met the definition of obese in 2002-National Center for Health Statistics, Centers for Disease Control). In addition, Colorado has a large Hispanic population, an ethnic minority with a high prevalence of insulin resistance, Type 2 diabetes, and attendant co-morbid conditions such as cardiovascular disease. Hispanics represent 12.5% of the US population (Census 2000), but presently represent 17% of the population of Colorado (6th highest in the US). Like the rest of the country, Colorado is also graying. The aging of the US population is a well-described demographic phenomenon. In the period between 1990-2000, Colorado had the 7th fastest growth in the percent of the population aged 65 yrs or older (Administration on Aging, department of Health and Human Services). Thus, the proposed program in Human Bioenergetics is positioned to serve local, regional, and national public health issues. Further, by training graduate students in the interdisciplinary aspects of human health and disease prevention, the challenges faced by the state of Colorado with respect to the foregoing demographic/public health issues will be enhanced. Specifically, trainees will be positioned to serve the state (and the nation) in a variety of capacities, including: public health educators, basic and applied research scientists, and University-level educators. It should be noted that the proposed Ph.D. program would also be positioned to interact with existing Ph.D. programs/research efforts at CU, UNC, and UCHSC. Such a "team approach" to addressing public health issues would have the potential serve the state in exciting news ways. Lastly, we envision great synergy with the proposed Colorado School of Public Health in addressing the health needs of Colorado's citizens.

3. Evidence of Need for the Program

- **Provide evidence of the need for the program. Please be explicit. (Needs assessment information may be presented in the form of survey data; summaries of focus groups or interviews; documented requests for the program from students, faculty, external constituents; etc.)**

Student Perspective: At present, a small but significant number of Ph.D. students who wish to be mentored by HES faculty and conduct research in HES labs have been accommodated via entry into the Ph.D. programs in other units on campus (FSHN, BMS, ME, Civil Eng.). Specifically, HES faculty have chaired 9 Ph.D. students in other units over the past 7 years (See Table 1 below for details). In addition to external inquiries, current and former MS students from HES have voiced strong support for a Ph.D. program in HES. Importantly, 12 HES MS graduates have entered Ph.D. programs in the past 5 years (5 of whom have stayed at CSU to enter into Ph.D. programs in either FSHN or BMS and be mentored by HES faculty).

Table 1. Ph.D. students trained by HES faculty

Name	Department	Year	Dissertation Title
Stob, Nicole	FSHN	2004	“Post exercise protein feeding does not alter markers of translation initiation or skeletal muscle function”
Alvarez, Guy	Physiology	2002	“Sympathetic neural activation in human obesity”
Calsbeek, Dean	Physiology	2002	“Metabolic adaptations to weight loss in obese humans: effect of fat type”
Beske, Stacy	Physiology	2001	“Effect of obesity on cardiovagal baroreflex gain”
Ho, Richard	FSHN	2001	“Ethnic differences in insulin signaling”

Name	Department	Year	Dissertation Title
Mickleborough, Tim	Physiology	2000	“Dietary Sodium as a Moderator of Exercise-Induced Asthma”
Reiser, Raoul, II	Mechanical Engineering	2000	“Biomechanics of Recumbent Cycling: Instrumentation, Experimentation, and Modeling”
Lin, Chun-An	Civil Engineering	1998	“The Simulation of the Cardiovascular Responses to LBNP up to -40 mmHg”
Davrath, Linda R.	Physiology	1998	“Mechanisms of Lower Body Negative Pressure-Induced Syncope”
White, Deborah	Physiology	1994	“Influence of Gender and Aerobic Fitness on the Cardiovascular Responses to Central Hypervolemia”

Faculty Perspective: The number of tenure-line faculty who have substantial research programs with external funding in HES has grown considerably since 1996. During this time, 8 current faculty have been added to the unit (Drs Bell, Butki, Dinunno, Hamilton, Hickey, Israel, Nelson, Reiser, and Tracy). Each of these faculty bring extramural support and the desire to mentor Ph.D. students in their respective labs. Moreover, all departmental faculty have unanimously expressed a strong desire to be able to mentor/train Ph.D. students. In addition to the mentoring/chairing described above, HES faculty have been actively involved in Ph.D. committee membership in collaboration with colleagues in a variety of units. Specifically, HES faculty have served as members of Ph.D. committees from the following units: Biomedical Sciences, Engineering, Education, FSHN, and Psychology. At present, faculty in HES hold in excess of \$2.3 million in extramural research funding (predominantly from NIH) through 2010, and we anticipate submitted grants to total >\$2 million annually in the future.

External constituents: External student inquiries regarding a Ph.D. in HES have been consistently averaging 10-15/yr for the past 6 years. As the department’s national reputation has grown, student requests for doctoral training has increased. In addition, the demand for trainees with the integrative background proposed herein is large. The last 5 Ph.D. trainees mentored by HES faculty have been placed into post-doctoral fellowships at the following institutions: 1). The Joslin Diabetes Center, Boston, 2). Harvard University, 3). The

University of Texas Health Sciences Center-San Antonio, 4). The University of Colorado Health Sciences Center, and 5). The University of Colorado. Each of these trainees is completing a post-doctoral fellowship in internationally recognized research laboratories, supported by the National Institutes of Health. This strong placement record speaks both to the quality of the training by HES faculty, and to the demand for high quality Ph.D. students.

- **Identify statewide and nationwide employment needs the proposed program would assist in filling. Provide evidence of regional or national need for additional qualified individuals such as the proposed program would produce.**

HES has made outreach a primary objective of all departmental activities (integrating it with research and teaching responsibilities). This has provided an opportunity to develop strong relationships with a variety of external constituents. As the outreach efforts have grown, it has become apparent that highly trained Ph.D. level scientists/educators who share the vision of the integration of research, education, and public service are needed to serve public health needs on a regional and national basis. Outreach efforts such as the Heart Disease Prevention Program, the Department's Caring for Colorado Grant to serve uninsured minorities, and efforts in collaboration with Cooperative Extension to provide the tools to encourage physical activity and nutritional behavior change are examples in which the ongoing research activities of departmental faculty are integrated into public health education efforts. While this model fits the classic land-grant mission neatly, it should not be taken as a land-grant "only" approach to the integration of research, service, and education. Such an approach can (and should) fit in other university settings, and medical schools, and with public health advocacy groups (i.e., American Heart Association, and the like). Graduates of the proposed Ph.D. program in Human Bioenergetics receive integrative and multidisciplinary training in human physiology, health, disease prevention and rehabilitation issues, from the molecular to the integrative control level. Such comprehensive training is anticipated to put trainees in high demand, given the complex and multifactorial nature of chronic disease.

4. Evidence of Student Demand

- **What are the projected numbers and characteristics (e.g., index scores, residency status, ethnic background) of the students to be served? What is the estimated number of graduates of the proposed program over the next five years? On what information are these projections based?**

On the basis of historical interest in a Ph.D. program in HES, and the number of externally funded faculty within the unit who are capable of financing and mentoring Ph.D. students, we project that the program will have a total enrollment of 15-18 upon reaching steady-state during year 4. Thereafter, we anticipate a minimum of 3 Ph.D. candidates completing degree requirements on an annual basis. This anticipated graduation rate is comparable to the CSU mean for Ph.D. programs (mean = 0.2 Ph.D./yr/tenure line faculty; with 2 new hires in place by Fall 2006, HES = 14 tenure line faculty, or 2.8 Ph.D. degrees /yr). Prospective students will likely hold an MS degree upon entry, and many may also have registered dietitian certification (RD). They will have a common interest in chronic disease prevention, and most graduates will seek employment in University settings as tenure-line faculty. If our proposal for differential tuition is approved we will add additional tenure track faculty on a progressive basis who will be capable of funding and mentoring additional Ph.D. students.

- **Provide evidence from surveys, interviews, or other sources that indicates that students would actually enroll in this program if it were approved. Include as much detail as possible.**

During fall of 2004 the Department conducted several surveys inquiring about student interest in a doctoral program in Human Bioenergetics at CSU. Following are the results.

1. CSU seniors and interest in potential Ph.D. program
34 total students
Would you potentially apply?
16 Yes (47%); 8 No (24%); 10 NA (29%)

2. CSU current MS students in HES
25 total students
Would you potentially apply?
3 Yes (12%); 0 No; 0 NA

Would presence of Ph.D. program be positive for MS students?
3 Yes (12%); 0 No; 0 NA

3. CSU MS program graduates 2001-2004
40 total surveys sent
8 returned surveys (20%)
Would you potentially apply?
3 Yes (37.5%); 1 No (12.5%); 4 NA (50%)

Would presence of Ph.D. program be positive for MS students?
8 Yes (100%); 0 No; 0 NA

4. Survey of seniors at Mesa State University in HES
23 total students
Would you potentially apply?
8 Yes (34.7%); 12 No (52%); 4 NA (17.3%)

5. Survey of seniors at Fort Lewis College in HES
28 total students
Would you potentially apply?
16 Yes (57%); 9 No (32%); 3 NA (11%)

6. Survey of seniors at CSU-Pueblo in HES
36 total students
Would you potentially apply?
25 Yes (69%); 11 No (31%); NA (0%)

5. Duplication/ Similar Programs in the State

- **Identify other closely related Colorado programs. List these by title of program and name/campus of institution that might be perceived as having programs in the same academic domain. For each, provide the following:**

Title of Program-Integrative Physiology

Name of Institution (particular campus if relevant): University of Colorado (Boulder)

Name and title of contact person you interacted with on that campus to derive information: Dr. Robert Mazzeo, Associate Professor and Director, Graduate Programs

Focus of other program's curriculum: The mission of the Department of Integrative Physiology is to discover and promote knowledge of how humans and other animals function at the level of cells, organs, and systems. The program of study emphasizes both the role of physical activity in human health and function across the lifespan and the responses of different organisms to various forms of stress.

Likely career path(s) for students completing other program: University Professors, medical school researchers, pharmaceutical researchers.

Compare/contrast CSU's proposed program to other program: The University of Colorado's Department of Integrative Physiology offers a superb Ph.D. program which resulted from the merger of the Department of Kinesiology and part of the Department of Biology in 2003. The proposed Ph.D. in Bioenergetics is designed to be complementary to the CU program in Integrative Physiology, with the aim of best positioning the respective strengths of the two programs to serve the needs of the state and nation. However, the Ph.D. in Bioenergetics clearly provides distinct training. Foremost is the close association of the Human Bioenergetics Ph.D. with formal training in nutrition (which is not offered at CU). Further, the epidemiology and behavioral expertise at CSU is not duplicated at CU.

If program is similar to the one being proposed by CSU, is there documented state or national demand legitimizing the need for an additional program in the state?

There is a clear public health demand for more trained professionals with expertise in the pathogenesis, prevention, and treatment of chronic disease. The 2004-2005 Occupational Outlook Handbook (Bureau of Labor Statistics) report that the fastest growing occupations for individuals with doctoral degrees include post-secondary teachers, medical scientists, and biochemists. In addition, the statistics on the increased prevalence of obesity, diabetes, and cardiovascular disease both regionally and nationally speak to the need for further efforts to confront this enormous public health challenge.

Title of Program: School of Sport and Exercise Science

Name of Institution (particular campus if relevant): University of Northern Colorado

Name and title of contact person you interacted with on that campus to derive information: Carole Schneider, Ph.D. Professor

Focus of other program's curriculum: The School of Sport and Exercise Science is concerned with the many aspects of human movement and its application to sport management, physical activity, and the quality of life. Within the school, students have the opportunity to study in one of several focused areas of human movement including physiological and biomechanical aspects of exercise, psychological and sociological aspects of physical activity, traditional and outdoor physical education, as well as the marketing and management of sport.

Likely career path(s) for students completing other program: The degree programs prepare students to compete successfully for careers in the allied health industries, and university teaching positions in physical education, exercise physiology, and sport management.

Compare/contrast CSU's proposed program to other program: The University of Northern Colorado is well known for its excellence in pedagogy (teacher preparation), and the Ph.D. program in Sport and Exercise Science has also established an excellent reputation for programs in Sport and Exercise Science. The proposed Ph.D. in bioenergetics offers unique training in nutrition, bioenergetics, and epidemiology that will position CSU to complement the research and scholarly activities at UNC.

If program is similar to the one being proposed by CSU, is there documented state or national demand legitimizing the need for an additional program in the state? As stated above, there is a clear public health demand for more trained professionals with expertise in the pathogenesis, prevention, and treatment of chronic disease. The proposed Ph.D. in Human Bioenergetics complements existing programs at UNC, and it is intended that such complementary programs will enhance collaborative research and training efforts with an aim of meeting the rapidly changing health needs of the citizens of Colorado.

In what ways, if any, will resources of other Colorado State University programs or other state institutions be shared in the proposed program? How will the proposed program be complementary to, or cooperate with existing program(s)?

There will be no formal sharing of resources between the proposed Ph.D. program and other CSU units or other state institutions. However, we do envision collaborative research, teaching and outreach efforts both within the CSU community and with CU-Boulder and UNC. There is precedent for this already: With respect to collaborative work with other CSU units, HES has, as already noted, a history of mentoring Ph.D. students from other units (most commonly BMS and FSHN). In addition, HES MS candidates have taken courses in both of these units as elective graduate credits. It is expected that under the new Ph.D. program in Bioenergetics, such relationships will continue. Specifically, Bioenergetics Ph.D. students will have access to graduate coursework in both BMS and FSHN, and graduate students in both units will also have access to new courses offered as part of the bioenergetics Ph.D. program. Moreover, it is anticipated that faculty in both BMS and FSHN will serve as Ph.D. committee members under the new program. It should be made clear that the approval of a Ph.D. in Bioenergetics is NOT expected to require additional resources from nor place additional burdens on either of these units. With respect to other institutions, HES graduate students have completed internships with the Rocky Mountain Cancer Rehabilitation Center in Greeley, and CSU faculty have a history of collaborative research relationships with CU-Boulder. Two recent Ph.D. students mentored by HES faculty are pursuing post-doctoral studies at CU, one former MS student is pursuing a Ph.D. at CU, and one HES faculty member is a mentor on an NIH clinical Career development Award by a faculty member at CU. Additionally, three recently hired faculty in HES have trained at CU-Boulder (1 completed a Ph.D., and 2 completed post-doctoral training.). Thus, the likelihood of continued relationships with both CU and UNC is quite high (and, importantly, does not involve new initiatives, but growth of existing ones).

6. Student Body

For Graduate Programs

- **What number do you feel would be ideal for the “entering class?” Present a time line explaining how you expect those numbers to grow as you build toward your first graduating class. How many students do you expect to graduate in a given year once the program is at ideal size? Please give specific information as to why you target the ideal number at the level you chose.**

The ideal number of full time students enrolled in the program is 15-18. This number will obviously vary slightly on the basis of faculty extramural funding.

Timeline:

YEAR	Entering Class	Total Ph.D. students
FY 2008	5-6	5-6
FY 2009	4-5	9-11
FY 2010	4-5	13-16
FY 2011	4-5	15-18
FY 2011- beyond	4-5	Steady state achieved in 3-4 years (3 year program minimum). After year 3 (FY 2010), we anticipate a minimum of 3 Ph.D. degrees awarded per year.

7. Admission Requirements

- **Are any requirements for admission to the proposed program being recommended that are higher than CSU’s minimum requirements? If so, what are the recommendations? What is your rationale for the higher standards?**

Students seeking admission to the doctoral program in Bioenergetics (Ph.D. in Bioenergetics) in the Department of Health and Exercise Science must:

- 1) meet Colorado State University [Graduate School](#) minimum requirements;
- 2) hold a Master’s degree from a program in a related discipline;
- 3) have completed a research thesis or equivalent; and
- 4) have a commitment from a faculty member to serve as the dissertation and academic advisor.

International student applicants from non-English speaking countries must also demonstrate English proficiency by completing the TOEFL exam with a total score of at least 550 (paper based test), 213 (computer based test) or 80 (internet based test).

Prerequisite/background course requirements will depend on the specific area of research interest associated with potential faculty advisors. Generally, discipline related courses along with science courses will be necessary.

Admission to the doctoral program is dependent upon the availability of resources and of a faculty dissertation advisor/mentor to oversee the program of study (required course work) and to guide the dissertation project. Thus, interested students are strongly advised to contact individual [faculty](#) members in an [area of interest](#) and to visit campus. Because of this required linkage with a faculty mentor upon entry into the program, individual applicants might be denied admission even though the general qualifications for admission are met if there is not a faculty member willing or able to accept the student into his or her mentorship. While it is possible that this student-mentor relationship could develop during the application process, it is advantageous for the potential applicant to initiate conversations with potential faculty advisor(s) well before applying to the program.

Application Process

To apply to the doctoral program in Bioenergetics in the Department of Health and Exercise Science:

- 1) complete the online application from the [Graduate School](#) (all official undergraduate and graduate transcripts and the application fee will be required);
- 2) submit a letter of application to the Department of Health and Exercise Science to include a statement of career goals and research interests (Attach your curriculum vita and any supporting documents such as thesis and/or publications); and
- 3) submit three letters of recommendation from former/current professors.

A personal interview will be required of all finalists for admission. Final acceptance and continuation in the program are contingent upon the sponsorship by a faculty member who will serve as the dissertation and academic advisor. The admission of a student into the program and the selection of an advisor are by mutual agreement and are formalized in the letter of acceptance from the department.

Program of Study

Core Course Requirements: 18 credits plus minimum of 12 credits of HES799 (dissertation) = 30 credits total required in core.

Cognate Area Requirements: Minimum of 12 credits in didactic/regular course (numbered 500-780) electives plus minimum of 6 credits in statistics cognate = 18 credits.

Total Minimum Credits Required for Degree: minimum of 48 credits (30 credits core requirements plus 6 credit statistics cognate plus 12 credit elective cognate area) plus a maximum of 30 credits awarded for Master's degree equals a total of 74 credits. If less than 30 credits are awarded for the Master's degree, the remaining credits must be taken to reach a minimum of 74 credits for the doctoral degree. Additional credits may be required by a graduate committee to address deficits in a given applicant's training/academic preparation. In addition, the credit totals for a given program of study may be well above the minimum credit expectations detailed above and below.

Comprehensive Examination: No later than one semester following completion of coursework, Ph.D. candidates will be required to complete a comprehensive examination (both written and oral). This examination will be developed by the graduate faculty of the department. The written exam will be completed over a 2 day period and submitted to the committee. Oral defense of the examination will take place no later than 2 weeks after the written exam. Students who fail to complete the written or oral components of the comprehensive exam will, at the discretion of the committee, be given no more than one attempt to retake the examination.

Preliminary Exam: No later than two semesters following the successful completion of the comprehensive examination, students will complete a preliminary examination under the direction of the Ph.D. committee. The preliminary exam will be comprised of a written grant proposal (modeled after the NIH-NRSA application). The written proposal will be provided to the committee 2 weeks prior to the oral defense. A Ph.D. candidate must successfully pass the preliminary exam before being eligible for further progress in the program.

Dissertation Defense: The dissertation defense will be scheduled upon satisfactory completion of data collection and analysis.