ASSESSMENT PLAN FOR THE *M.S.* IN EXERCISE SCIENCE: 2009 [11.17.2009]

Submitted by:

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Having now been on the Marshall University faculty since 1993 and having completed four (4) five-year Program Reviews for the Marshall University Board of Governors, I would be remiss if I did not comment on their findings. Below, you will find their considered recommendations. The complete 2008 and 2003 Reports can be accessed on my website: www.marshall.edu/coehs/hpl in the ***Graduate Programs*** section. A great deal of time and effort was dedicated to each of these reports, including the most recent one, and so I do consider them relevant to the current assessment evaluation. The figure below is a 20-year summary of Exercise Science graduates by 5-year reporting cycles.

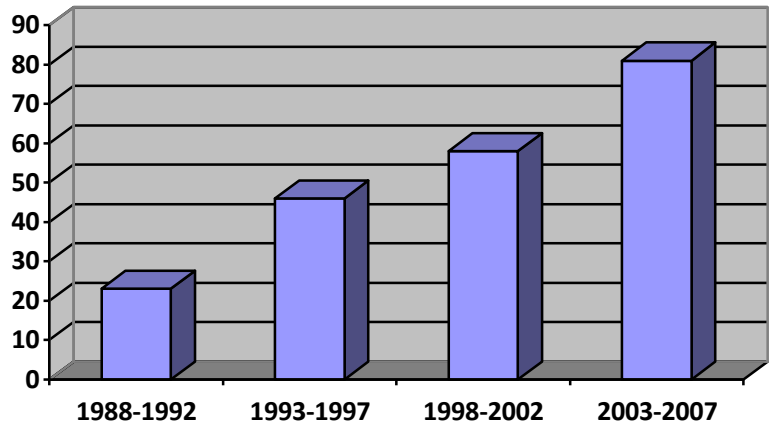
EXERCISE SCIENCE, M.S. DEGREE

1. 2008 Board of Governors Review Designation of Program Excellence **(PDF: 3.4MB)**
   (Download Adobe Acrobat Reader)
   Our 2008 report resulted in the Marshall University Board of Governors recommending that the MS in Exercise Science be continued at its current level of activity as a Program of Excellence.

2. 2003 Board of Governors Review Designation of Program Excellence **(PDF: 0.3MB)**
   (Download Adobe Acrobat Reader)
   Our 2003 Board of Governors Report resulted in the University System of West Virginia Program Review Committee recommending: "Continuation of the program at the current level of activity, with the designation as a Program of Excellence."

3. **1998 Board of Governors Review Designation of Program Excellence**
   Our 1998 Program Review Board of Governors Report resulted in the University System of West Virginia Program Review Committee approving continuation of the Graduate Exercise Science Program. Dr. Robert F. Edmunds, Coordinator, Program Review and Assessment, stated "The department is commended for an excellent assessment program."

4. **1993 Board of Governors Review Designation of Program Excellence**
   Our 1993 Program Review Board of Governors Report resulted in the Graduate Professional Degree Program Review Committee for the University System of West Virginia approving continuation of the Graduate Exercise Science Program. Dr. Bruce C. Flack, Director of Academic Affairs, stated "The committee concurs with the institutional recommendation to continue at the current level of activity. The Division is commended for providing a well-prepared report."



PROGRAM VALIDATION and MISSION STATEMENT

Seventy percent (70%) of all premature death and chronic disability could be prevented with appropriate lifestyle changes. This includes sensible nutrition, exercise, and stopping smoking. An active lifestyle (***Physical Activity and Health: A Report of the Surgeon General***), can significantly reduce all-cause mortality and morbidity as well as morbidity and mortality from cardiovascular disease (***Physical Activity and Cardiovascular Health: NIH Consensus Statement; Physical Activity and Public Health: A Recommendation From the Centers for Disease Control & Prevention and the American College of Sports Medicine***), diabetes (***Diabetes Prevention Program; Diabetes Prevention Study***), osteoporosis, obesity, mental health disorders, and cancer. The magnitude of these benefits can exceed that associated with procedural and pharmacological interventions.

As well, such lifestyles can increase our chances for longevity and improve the quality of our lives. Because of this awareness and the sky-rocketing cost of treatment-oriented health care, allied health professionals in preventive and rehabilitation programs are becoming major players in an approach to health care emphasizing health promotion and disease prevention rather than a preoccupation with treatment. Allied health professionals in such programs assist Americans in assuming some responsibility for their health. The number of such wellness, preventive, and rehabilitation programs is rapidly expanding. We intend for our graduates to make strong contributions in these areas.

To help meet this need, the School of Kinesiology offers a Master of Science degree in Exercise Science to prepare students for allied health and medical careers in the hospital and medical center, commercial, community, corporate wellness, cardiopulmonary rehabilitation, diabetes management, performance assessment and enhancement settings, and related research positions. Preparation for such careers includes an emphasis on leadership roles and skills that permit one to work with individuals on a client/patient/subject continuum extending from the elite athlete to those with chronic disorder/disease to the cardiac transplantation recipient as well as the in-between – the recreational athlete and those simply wishing to stay healthy by living sensibly.

The following two (2) sections, **CONSISTENCY WITH UNIVERSITY MISSION** and **CONSISTENCY WITH UNIVERSITY MISSION: FINAL COMMENT**, are taken from my recent 5-year ***Program Report*** to the ***Marshall University Board of Governors.*** This report covered the period 2003 to 2008.

CONSISTENCY WITH UNIVERSITY MISSION

1. Commitment to high quality masters education.

This commitment of the Graduate Exercise Science Program [GESP] is embodied in an emphasis on development of the clinical attitude, scientific attitude, and a final, all-encompassing, objective that nurtures careful, thoughtful, thorough, and responsible attitudes and work habits in the clinical professional setting. Our intensive curriculum has provided a solid foundation for highly competent and successful professionals in medicine and allied health related to health promotion, disease prevention, and rehabilitation. The listings of **Current Positions** in **Table 1** and **Some Employers** in **Table 2** document some achievements of our graduates.

- ✓ A *clinical attitude* includes an understanding and skill in applying carefully structured

strategies in managing patients/clients. Respect for the patient/client is paramount:

"*Ask not what disease the patient has, but, rather, what patient the disease has." Sir* William Osler [physician and scientist]

- ✓ A *scientific attitude* includes respect for clinical assessment and carefully obtained data, respect for well-taken heart rate and blood pressure measures as well as the most sophisticated medical procedures [e.g., coronary angiograms, ventriculograms].

Table 1. Selected Titles: Current Positions for Exercise Science Masters Graduates

Health System Senior Strategic Planning Analyst Administrator
Medical Center Supervisor
Administrative Director, Cardiothoracic Surgery
Director of Rehabilitation Services
Director, Cardiac Rehabilitation
Director of Clinical Trials
Director, Sports Performance Enhancement Center
Director, Fitness & Weight Loss Center
Director, Cardiac, Vascular & Pulmonary Services
Insurance Executive: Director of Health Care Services
Director, Corporate Wellness Center
Supervisor, Exercise Stress Testing Laboratory
Supervisor, Medical Center Occupational Health and Wellness
Supervisor, Department of Cardiac Rehabilitation
Head Athletic Trainer
Strength and Conditioning Coach
Branch Director YMCA
Manager, High Intensity Training [HIT] Center
Clinical Research Associate
Scientist for Pharmaceutical Product Development
Pacemaker Specialist, Cardiac Rhythm & Disease Management
Coordinator, Cardiac Rehab & Diabetes Exercise Center
Coordinator Wellness and Preventive Medicine
Coordinator, Therapeutic Lifestyle Intervention, M.D. Practice
Staffing Coordinator, Physician Recruiter for Healthcare System
Clinical Exercise Physiologist
Health and Wellness Specialist
Personal Trainer
Pharmaceutical Sales Representative
Pacemaker Sales and Management
Registered Dietitian, Cardiovascular Specialist
Cardiac Rehabilitation Dietetic Specialist
Clinical Dietitian
Physician Assistant
Physical Therapist
Doctor of Physical Therapy
Blind Rehabilitation Outpatient Specialist
Cardiology Electrophysiology Lab Technician
Ph.D., Exercise Physiology;
Ph.D., Health Care Administration
Pharmacy Doctorate [Pharm. D.]
Physician

Table 2. Some Employers of Exercise Science Graduates

The Cleveland Clinic Foundation	Duke University Medical Center
The Mayo Clinic	Charleston Area Medical Center
Cabell Huntington Hospital	Our Lady of Bellefonte Hospital
University of Virginia Medical Center	Nautilus Sports Fitness Centers
Ohio State University Medical Center	Dow Chemical Corporation
Dayton Heart Center	Williamson Memorial Hospital
The Atlanta Braves	Carolina Cardiology Group
Office of Strategy Planning	Howard Long Wellness Center
HIT Centers, Incorporated	Dayton Sports Medicine Institute
Merck Pharmaceutical, Inc.	Pfizer Pharmaceutical, Inc.
Guidant Pacemaker, Inc.	Medtronic Pacemaker, Inc.
Shady Grove Adventist Hospital[MD]	Carolina Cardiology, Inc.
Huntington Physical Therapy	Boone Memorial Hospital
Presbyterian Hospital [NC]	Aventis Pharmaceuticals
Presbyterian Hospital [NJ]	St. Mary's Hospital [WV]
Young Men's Christian Association	
Berkshire Family Medicine [PA]	
Peninsula Regional Medical Center [MD]	
Southern Ohio Medical Center	
Mountain State Blue Cross/Blue Shield	
Waianae Coast Comprehensive Health Center [Hawaii]	
Cabell Wayne Association of the Blind	
Johns Hopkins University School of Medicine	
John Hopkins Bayview Medical Center	
University of Virginia Health System	
Veteran's Administration Medical Center	
University of Cincinnati Medical Center	

Recently, Dr. Stephen J. Kopp, President of Marshall University, visited the ***Diabetes Exercise and Cardiac Rehabilitation Center.*** Here are selected comments from his gracious follow-up letter:

> *"The facility tour was very informative and the capabilities that were showcased are quite remarkable. You have done an exceptional job building this program, both from a clinical and research perspective…. I also enjoyed meeting your staff. Their dedication to the program was quite evident. The…therapy and rehabilitation programs offered are impressive. In addition, it is a great educational laboratory. Judging by the enthusiasm of the participants…during my visit, you and your staff are clearly making a positive difference in their lives."*

2. Contribute to the body of human knowledge through scholarly activities.

GESP faculty have accrued $1,174,000 in grants and contracts the past five [5] years to support our program and related research. **Table 3** summarizes our accumulated publications, papers, and professional development activities for the past fifteen [15] years. As the table shows, our faculty maintains active scholarly roles in their fields of expertise; the observed increase in professional presentations over the past decade reflects the leadership roles they have achieved in their respective disciplines. Our research and related publications and presentations at professional meetings have had an impact in the areas of cardiopulmonary rehabilitation, diabetes care, strength and conditioning, athletic training, and performance assessment and enhancement. It has examined relevant issues in preventive and rehabilitative medicine and allied health care. This includes confirmation of the positive impact of therapeutic lifestyle intervention on the clinical outcomes, quality of life, and economic outcomes for

our diabetes, cardiac, and pulmonary patients. Contributions to the burgeoning field of performance enhancement have also played an important role in that discipline.

This research has validated our diabetes, cardiac, and pulmonary patient management strategies and improved patient clinical outcomes. It is also used in graduate courses for instructional purposes [e.g., research methods, program development, and patient management]. And we have promoted the institutional image of Marshall University through our papers at international, national, regional, and state professional meetings.

Table 3. Scholarly Activity

	Professional Publications	Papers, Presentations
2004 - 2008	**24**	**70**
1999 - 2003	**27**	**71**
1993 - 1998	**21**	**12**

3. Commitment to society through public service.
Human Performance Laboratory Programs are partly staffed by selected graduate students, providing exceptional opportunities for their training as well as the training of other selected allied health professionals and the practical application of knowledge learned in the classroom. This commitment to our students and our patients is a strength of the program. Society is the ultimate benefactor.

Dr. Marley served on the Admissions Committee for the Joan C. Edwards Marshall University School of Medicine for several years. This responsibility required substantial professional and time commitments.

4. Commitment to diversity in our student body.
The GESP has included African Americans and students of Samoan and Hawaiian descent as well as students from England, Scotland, Canada, Brazil, Argentina, Korea, Japan, Thailand, and China. Curricular content also reflects diversity [e.g., African Americans, and Hispanics are at greater risk for hypertension and diabetes]. Gender, socioeconomic, and age diversity are also given important consideration. We have witnessed an increase in the enrollment of nontraditional students as well as students wishing to change careers.

5. Commitment to assuring the integrity of the curriculum through maintenance of rigorous standards and high expectations for student learning and performance.
We adhere to strict applications of student entrance criteria and curricular standards [e.g., advanced physiological principles, medical profile interpretation, case management, risk stratification, EKG interpretation]. Critical thinking skills are essential in the areas of allied health, preventive medicine, and rehabilitation. Judgment errors in these areas can lead to injury and death; we must be held to a higher standard, a six-sigma standard. The curriculum is reviewed regularly. An example of a recent curricular revision illustrates this point; Health Care Administration 600, a course in the School of Business was added as a requirement in the Clinical Applied Area of Emphasis.

6. Commitment to quality of health care in the region.
As noted earlier, the Diabetes Exercise Center, Cardiac Rehabilitation Program, Pulmonary Rehabilitation Program, and Chronic Pain Management Program

accumulate more than 16,000 *patient contact hours* annually, underlining our commitment to the health and well-being of Tri-State residents. In the words of one of our diabetes patients,

"This program has restored meaning and purpose to my life."

We are proud of our referring physician base. Dr. Kevin W. Yingling has been especially supportive. Here are selected comments from a recent letter:

"I appreciate the excellent programs that you…provide for the Cardiac, Pulmonary and Diabetes patients. Your exercise programs have been instrumental in improving the health of many of my patients and I am sure many citizens of our region."

Kevin W. Yingling, M.D., F.A.C.P.
Chairman
Department of Medicine
Joan C. Edwards School of Medicine at Marshall University

7. Commitment to securing funding for state-of-the-art classrooms to support scholarship and faculty development.

As noted in earlier, the Human Performance Laboratory classroom and Rehabilitation Center have been completely renovated and a state-of-the-art audiovisual console has been installed in the classroom. It includes Internet access, Power Point, DVD, VCR, and Sympodium capability. This console is used regularly by faculty, staff, and students for presentations and workshop tasks. The classroom is also used for patient education.

8. Commitment to remain current with the literature in our field.

This is a hallmark of our Human Performance Laboratory Programs. Current opinion, and adherence to clinical guidelines and standards of practice are essential in medicine and allied health. Literature reviews and discussion occur regularly in our Exercise Science classes and in our patient education programs.

Dr. Marley's **Personal Archive** website with the ***New England Journal of Medicine*** and his **File Folder** at the ***Journal of the American Medical Association*** website have proven particularly useful with this task; these sites are used regularly with class presentations and workshop development. The **American Diabetes Association, American College of Sports Medicine,** and **American Association of Cardiovascular and Pulmonary Rehabilitation** also provide valuable resources. A former student, currently a successful executive in the pharmaceutical industry provided this unsolicited comment:

"Dr. Marley has always done an excellent job of remaining current with the literature and injecting his knowledge into the courses."

Course lectures are revised on a regular basis to reflect the current literature.

CONSISTENCY WITH UNIVERSITY MISSION: FINAL COMMENT

Components of the GESP and related programs have been duplicated at centers in the region and across the country. As our students progress in their careers and assume positions of leadership, principles they have learned in the curriculum are being implemented into health promotion, disease prevention, cardiopulmonary rehabilitation, medical, and wellness disciplines. This includes medical profile testing, case development, patient screening, stratification, risk stratification, and other carefully structured patient/client management strategies.

As well, GESP training is having a positive impact on the credentials and certification of

our graduates. As noted earlier, our graduates are becoming physicians, scientists, clinical program directors, pacemaker specialists, physical therapists, physician assistants, registered dieticians, pharmacists, registered nurses, and related clinical professionals who complete licensure and certification requirements prior to entering their clinical practice. This will not change.

- Other examples are American College of Sports Medicine certification as an Exercise Specialist or Program Director, Certified Athletic Trainer certification by the National Athletic Trainers Association, and Advanced Cardiac Life Support [ACLS] certification by the American Heart Association.

In this context, here is an unsolicited comment from a graduate who is currently a successful executive in the pharmaceutical industry:

> "The ability for the University to offer clinical opportunities [i.e., graduate assistantships] is invaluable. I hope the recent decision of the University to cut GA positions will not reduce the clinical opportunities in Human Performance Laboratory Programs."

Our productive professional relationships with Counseling, Dietetics, Educational Research and Statistics, and the Marshall University Medical Center continue. Benefits Include courses, clinical observations and training, participation in oral comprehensive examinations, and student consultations for professional career planning.

HUMAN PERFORMANCE LABORATORY FACILITY AND PROGRAMS

The Human Performance Laboratory has undergone major renovation. Our facility includes the classroom and The Rehabilitation Center. The classroom was enlarged, repainted and a second mural placed. A new ceiling and new carpeting were installed. An audiovisual system that includes Internet access, an LCD projector, an ELMO, a DVD/VCR component, and Sympodium unit with new screen was also installed. This has enhanced the classroom setting and learning environment. The facility supports four (4) clinical programs:

- The Diabetes Exercise Center
- Cardiac Rehabilitation
- Pulmonary Rehabilitation
- Chronic Pain Management

These clinical programs serve the community and are a vital part of the learning environment. The Diabetes Exercise Center, the only one of its kind in the country, is part of the American Diabetes Association-certified **Bruce Chertow, MD, Diabetes Treatment Center of Marshall University Medical Center** and **Cabell Huntington Hospital**. Our **Cardiac Rehabilitation Program** and **Pulmonary Rehabilitation Program** are certified by the **American Association of Cardiovascular and Pulmonary Rehabilitation**. A **Chronic Pain Management Program**, staffed by three (3) physical therapists, provides aquatic therapy for patients with fibromyalgia and other pain syndromes. These programs are part of the longest clinical contract supported by Marshall University Research Corporation; it was initiated in 1997 by Dr. Marley in a meeting with the CEO, Chief of Staff, and Executive Committee of Cabell Huntington Hospital and the Chief of Staff for Marshall University Medical Center.

I. GRADUATE EXERCISE SCIENCE PROGRAM GOALS:

1. Student Academic Achievement

1.1 Students will demonstrate knowledge of subject matter in the field, including traditional sources of information and current literature.

1.2 Students will demonstrate knowledge of statistics, research design, and the ability to interpret current research articles.

1.3 Students will successfully apply carefully structured strategies learned in class to clinical problem-solving situations.
1.4 Students will demonstrate skillful use of current laboratory and related technical equipment as well as the related procedures and techniques.
1.5 Students will demonstrate respect for the client/participant/athlete/patient entrusted to his/her care [i.e., "the clinical attitude"].
1.6 Students will demonstrate respect for scientific and clinical assessment procedures and carefully taken data.
1.7 Students will develop careful, thoughtful, thorough, and responsible attitudes and work habits in the clinical and related allied health care settings.

2. Faculty Development

2.1 Classes will be taught by full-time, tenure track faculty with or actively pursuing a terminal degree.
2.2 Tenure track faculty will participate in scholarly activity.
2.3 Tenure track faculty will attend professional conferences and workshops to maintain their knowledge of current opinion in their respective fields.

3. Curriculum Development

3.1 The curriculum will be consistent with current opinion in the field as established by professional societies and contemporary literature.
3.2 The curriculum will reflect new theoretical and technical developments that includes an emphasis on the related scientific literature.
3.3 This unique curriculum will continue to prepare students for a broad spectrum of careers in health promotion, disease prevention, rehabilitation, medicine, allied health, sports science, and the pharmaceutical and pacemaker industry.
3.4 Content and materials to prepare students for other allied health careers will continue to be incorporated in the curriculum when opportunities are presented. For example, one of our graduates recently accepted a new position as **Clinical Trials Manager/Director** with the **Society for Minimally Invasive Spine Surgery** in California.

II A. LEARNING OUTCOMES:

What you are to be, you are now becoming.

To become an astute clinician, one must work assiduously to develop their clinical management and problem-solving skills. Pattern recognition with clarity and effectiveness is essential. The curriculum assists them with carefully structured and creative strategies.

Another essential consideration in our work is the elimination of error. That is, our decisions, many times, can have profound influences on the health and well-being of those entrusted to our care and supervision. In our business, we do play for keeps. When mistakes or errors in judgment are made, people can get hurt and people die. In my experience with more than 40,000 patients and as a Professional Witness in Cardiology and Cardiovascular Medicine, I have seen this first-hand.

Our work requires mature and responsible performance aimed at errorless performance. We aim for a 6-sigma level; that is 99.99966 % of perfection. In industry, things generally go right about 97 times out of 100. That is a standard between 3- and 4-sigma. Quality like that in the clinical setting could mean 5,000 incorrect surgical operations weekly and hundreds of thousands of wrong drug prescriptions filled yearly. Not much fun to think about. A 6-sigma level of performance equates to fewer than 3.4 errors per million items or procedures. Still too many errors, but much better than the alternative.

1. Program Learning Outcomes:

1.1 Students will be skillful in the research application of basic statistical analyses.

1.2 Students must be capable of describing basic research design. This includes descriptive research, quantitative experimental research, qualitative research methods, and applications of the *null hypothesis*.

1.3 Student will be informed and skillful in discussions of contemporary related literature and current scientific opinion.

1.4 Students must be informed and able to identify and implement current clinical practice guidelines in their area of emphasis. This would include the following:

1. Screening, stratification, and risk stratification of clients/patients.
2. Policies and procedures for sports medicine, sports science performance assessment and enhancement, ambulatory Phase I, Phase II, and Phase III-long-term care cardiac patients.
3. Management procedures for coronary artery bypass graft surgery [CABGS], percutaneous coronary intervention [PCI], and cardiac transplantation patients. Include the application of cardiac imaging at rest and with exercise stress here.
4. Perform multi-stage exercise testing [MSET] skillfully, understand and apply contraindications to exercise stress testing and exercise.
5. Prepping individuals for exercise testing, exercise therapy, and training.
6. Develop and teach exercise prescription for all modalities, manage patients/clients with chronic disorder through a program and develop progress reports.
7. Interpret lipid profiles and related bloodwork findings; relate them to patient/client clinical interventions and outcomes. Students must know, be able to interpret, and be skilled in applying the standards in **Tables 3.2** and **3.3** below.

TABLE 3.2. ATP III CLASSIFICATION OF LDL, TOTAL, AND HDL CHOLESTEROL ($mg \cdot dL^{-1}$)

LDL CHOLESTEROL	
<100[a]	Optimal
100–129	Near optimal/above optimal
130–159	Borderline high
160–189	High
≥190	Very high
TOTAL CHOLESTEROL	
<200	Desirable
200–239	Borderline high
≥240	High
HDL CHOLESTEROL	
<40	Low
≥60	High
TRIGLYCERIDES	
<150	Normal
150–199	Borderline high
200–499	High
≥500	Very high

LDL, low-density lipoprotein; HDL, high-density lipoprotein.

[a]According to the American Heart Association/American College of Cardiology 2006 update (endorsed by the National Heart, Lung, and Blood Institute), it is reasonable to treat LDL cholesterol to <70 $mg \cdot dL^{-1}$ (<1.81 $mmol \cdot L^{-1}$) in patients with coronary and other atherosclerotic vascular disease (15).

NOTE: To convert LDL cholesterol, total cholesterol, and HDL cholesterol from $mg \cdot dL^{-1}$ to $mmol \cdot L^{-1}$, multiply by 0.0259. To convert triglycerides from $mg \cdot dL^{-1}$ to $mmol \cdot L^{-1}$, multiply by 0.0113.

Adapted from National Cholesterol Education Program. *Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)*. Washington, DC:2002. NIH Publication No. 02–5215.

TABLE 3.3. TYPICAL RANGES OF NORMAL VALUES FOR SELECTED BLOOD VARIABLES IN ADULTS[a]

VARIABLE	MEN	NEUTRAL	WOMEN
Hemoglobin ($g \cdot dL^{-1}$)	13.5–17.5		11.5–15.5
Hematocrit (%)	40–52		36–48
Red cell count ($\times 10^{12}$/L)	4.5–6.5		3.9–5.6
Mean cell hemoglobin concentration (MCHC)		30–35 ($g \cdot dL^{-1}$)	
White blood cell count		4–11 ($\times 10^{9}$/L)	
Platelet count		150–450 ($\times 10^{9}$/L)	
Fasting glucose[b]		60–99 $mg \cdot dL^{-1}$	
Blood urea nitrogen (BUN)		4–24 $mg \cdot dL^{-1}$	
Creatinine		0.3–1.4 $mg \cdot dL^{-1}$	
BUN/creatinine ratio		7–27	
Uric acid ($mg \cdot dL^{-1}$)	4.0–8.9	2.3–7.8	
Sodium		135–150 $mEq \cdot dL^{-1}$	
Potassium		3.5–5.5 $mEq \cdot dL^{-1}$	
Chloride		98–110 $mEq \cdot dL^{-1}$	

SGOT, serum glutamic-oxaloacetic transaminase; AST, aspartate transaminase (formerly SGOT); SGPT, serum glutamic-pyruvic transaminase; ALT, alanine transaminase (formerly SGPT).

[a]Certain variables must be interpreted in relation to the normal range of the issuing laboratory.

[b]Fasting blood glucose 100–125 $mg \cdot dL^{-1}$ is considered impaired fasting glucose or prediabetes.

NOTE: For a complete list of Système International (SI) conversion factors, please see http://jama.ama-assn.org/content/vol295/issue1/images/data/103/DC6/ JAMA_auinst_si.dtl

TABLE 3.3. TYPICAL RANGES OF NORMAL VALUES FOR SELECTED BLOOD VARIABLES IN ADULTS[a]

VARIABLE	MEN	NEUTRAL	WOMEN
Osmolality		278–302 mOsm/kg	
Calcium		8.5–10.5 $mg \cdot dL^{-1}$	
Calcium, ion		4.0–5.2 $mg \cdot dL^{-1}$	
Phosphorus		2.5–4.5 $mg \cdot dL^{-1}$	
Protein, total		6.0–8.5 $g \cdot dL^{-1}$	
Albumin		3.0–5.5 $g \cdot dL^{-1}$	
Globulin		2.0–4.0 $g \cdot dL^{-1}$	
A/G ratio		1.0–2.2	
Iron, total ($mcg \cdot dL^{-1}$)	40–190		35–180
Liver Function Tests			
Bilirubin		$<1.5\ mg \cdot dL^{-1}$	
SGOT (AST)	8–46 $U \cdot L^{-1}$		7–34 $U \cdot L^{-1}$
SGPT (ALT)	7–46 $U \cdot L^{-1}$		4–35 $U \cdot L^{-1}$

SGOT, serum glutamic-oxaloacetic transaminase; AST, aspartate transaminase (formerly SGOT); SGPT, serum glutamic-pyruvic transaminase; ALT, alanine transaminase (formerly SGPT).

[a]Certain variables must be interpreted in relation to the normal range of the issuing laboratory.

[b]Fasting blood glucose 100–125 $mg \cdot dL^{-1}$ is considered impaired fasting glucose or prediabetes.

NOTE: For a complete list of Système International (SI) conversion factors, please see http://jama.ama-assn.org/content/vol295/issue1/images/data/103/DC6/ JAMA_auinst_si.dtl

8. Develop skill in measuring blood pressure and teaching heart rate assessment.
9. Relate risk factor identification and management to intervention strategies, risk reduction and outcomes.
10. Assist physicians with physical examinations.
11. Develop EKG reading and interpretation skills.
12. Understand the clinical procedures for determining the occurrence of a myocardial infarction [MI].
13. Develop business skills and acumen.
14. Develop skills and background in Advanced Cardiac Life Support [ACLS].
15. Develop an appreciation for "Doctor's Orders" and standing orders relative to the occurrence of an MI, ACLS, exercise prescription, and related clinical procedures.
16. Develop skills with metabolic assessment of human performance and physical work capacity [PWC] as well as related clinical variables.
17. Develop skills with human performance assessment and performance enhancement.
18. Develop a *clinical attitude* – respect for the client/patient.
19. Develop a *scientific attitude* – respect for clinical assessment procedures and carefully taken data.
20. A final, all-encompassing, objective is the development of careful, thoughtful, thorough, and responsible attitudes and work habits in the clinical and allied health settings.
21. Understand and interpret medical profiles and analyze case study findings. This item is of primary importance. The student's **Case Study Presentation** is a focus of their final oral examination and incorporates all

of the knowledge and skills gained in their course of study. Dr. Marley has developed the **Case Study Format** used in the curriculum; it is the result of his more than 30 years experience in the clinical setting. The following outline summarizes this presentation:

wpm CASE STUDY FORMAT II: MEDICAL PROFILE TEST

Relate to ACSM Gold Book, 8th Edition

Preliminary and Ongoing Progress Report Considerations

- Risk Stratification:Table 2.1,p. 23; Fig. 2.3, p. 24. Fig. 2.4, p. 32; Tables 1.1, 1.2, pp. 4,5; Table 5.1,p.106. Relate Bayes' Theorem in this context.
- Recommendations for current medical exam and exercise testing prior to participation; physician supervision of exercise tests: Table 2.4, page 32.
- AACVPR Risk Stratification for Cardiac Patients: Box 2.3, pages 36, 37.
- AHA Risk Stratification Criteria: Box 2.2, pp. 33-35.

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1. ***Medical History*:** See Box 3.1, Components of the Medical History, page 43. Remember gender and age; include both past and current information.

2. **Physical examination findings:** See Box 3.2. Components of the Pre-exercise Test Physical Examination, p. 44. See Recommended Laboratory Tests, Box 3.3, page 45. Inspection of the skin, especially of the lower extremities in diabetes patients. Absence or presence of arcus cornealis, tendon xanthoma and skin xanthelasma. Palpation and inspection of lower extremities for edema and presence of arterial pulses. Palpation and auscultation of the carotid, abdominal, femoral, dorsalis pedis, and posterior tibial arteries.

3. ***Multi-stage exercise test (MSET*):** See Modes of Testing, pp. 74-80, and Box 4.4, p. 81; Figure 5.3, pp. 114,115; Table 5.2, p. 117, Boxes 5.1 to 5.3, pp. 118-122. Relate the Long Sheet and Dysrhythmia Summary Sheet. Pretest measures – EKG (standard, test leads), HR and BP; exercise responses - APHR, PHR - clearance HR, %APHR achieved, workload achieved; hemodynamic aspects-HR and BP, RPP (double product, including relating to ST/dysrhythmia, BP, other threshold measures), EKG (contour/ST changes, dysrhythmia); objective and subjective stopping codes – see Boxes 4.5, p. 83, and 5.2, p.119; post-exercise recovery pattern for all variables to 10 minutes. What criteria would you use for contra- indicating an MSET? See Box 3.5, p.54. What criteria would you consider when evaluating patient or client responses to testing? **Review Table 4.7, p. 83 [reference Fig. 10.1, p.226], and Fig. 5 .4, p. 120** [*Subjective Ratings and Symptoms*]. Electrocardiographic, Cardiorespiratory, and Hemodynamic Responses to Exercise Testing and Clinical Significance, Box 6.1, pages 137,138. See exertional hypotension discussion, page 139 and Box 6.1.

4. ***Functional Heart Classification*** (attached): I, II, III, and IV. See attached **handout** and Figure 5.3, pages 114, 115.

5. ***Fitness level*** (physical work capacity): ml/O_2/kg/minute. Some applications: 5 METS as one criterion for discharge and as a criteria for Social Security Administration disability classification. CHF prognosis has been related to a 4 METS level. Refer to ACSM ***Compendium of Physical Activities***. See Figure 5.3, pp. 114,115; Table 4.8, pp. 84-89.

6. ***Pulmonary function test/screen*:** See Table 3.4, pages 51,52; **FEV_1** and **FEV_1/FVC** are diminished with chronic obstructive pulmonary disease (COPD) [e.g., asthma, chronic bronchitis, emphysema], but remain normal for restrictive disorders [e.g., neuromuscular/ paralytic disease (polio): mechanical reduction (kyphoscoliosis); interstitial lung diseases (pneumoconiosis). COPD is defined by diminished **FEV_1** & **FEV_1/FVC**, restrictive defects by reductions in **TLC** and **FVC<80%.** The ***BODE INDEX*** is much better at predicting mortality than spirometry data alone, with higher scores indicating a greater mortality risk; this ***INDEX*** also captures beneficial effects of pulmonary rehabilitation. Screen and refer. **See Session 1, p. 7.**

7. ***Lipid analysis/CBC and related bloodwork***: Tables 3.2 and 3.3, pp. 48, 50; Table 3.5, p. 55. Relate ATP-III, Table 3.2, p. 48, & ***metabolic syndrome***, Table 10.3, pp. 250-253.

8. ***Body composition*:** Pages 62-72. Note especially Body Mass Index [Table 4.1, p. 63] and waist circumference. These variables are particularly relevant for patient cardiovascular disease and diabetes and can be predictive for apparently healthy individuals at risk. These variables, along with percent bodyfat, are considered important tools in preventive and rehabilitative medicine.

9. ***Doppler screening and peripheral vascular disease*** [pp, pp. 258-260]: dorsalis pedis, posterior tibial, carotid arteries. See Physical Examination comments.

10. ***Coronary artery disease (CAD) Risk factor Thresholds/Major Signs or Symptoms assessments*:** Table 2.2, pp. 26,27, and Table 2.3, p. 28; Table 3.1, p. 47; Figure 2.2, p.21.

MEDICAL PROFILE AND PATIENT MANAGEMENT:

- Clinical Report: Capsular Summary, Summary of Physical, Summary of MSET.
- This includes recommendations to the referring physician and patient.
- Consultation(Talk Visit)/Recommendation Form
- Program
- Progress Reports
- Reevaluation/Consultation (Talk Visit)/Reevaluation Recommendation Form

FORMS:

1. Medical History, Chest Pain, MSET Long Sheet, MSET Dysrhythmia Summary.
2. Recommendation Form, Reevaluation Recommendation Form.
3. Category Change(e.g., upon completion of cardiac rehabilitation Phase II).
4. Reentry Form(after 12 weeks out of program or known event occurs).
5. Exercise Prescription; HR/BP Record; Exercise Session Dysrhythmia Summary Form.

The following rubric outlines the Case Study Presentation required of all students during their final oral examination. It is a primary focus of their curriculum.

683 CASE STUDY PRESENTATION RUBRIC

This presentation will be made to Dr. Marley following the format outlined in the CASE STUDY FORMAT II: MEDICAL PROFILE TEST.

1. Your typed clinical report will include the ten [10] itemized areas on the handout. A discussion and class review will clarify your assignment.
2. You will not be required to prepare other MEDICAL PROFILE AND PATIENT MANAGEMENT material.
3. You will not be required to use forms other than the ones listed below. You are also not required to complete the **PRELIMINARY AND ONGOING PROGRESS REPORT CONSIDERATIONS** presented in the initial section of the **CASE STUDY FORMAT II: MEDICAL PROFILE TEST** handout.
4. The subject will be a 50 year-old male/female post-myocardial infarction [MI] cardiac patient; do not include cardiac transplantation, coronary artery bypass graft surgery [CABGS], or percutaneous coronary intervention [PCI].
5. The subject will be a fictitious patient, but the information must be credible.
6. The forms and related information required for this presentation are:
   - ✓ The Long Sheet
   - ✓ RECOMMENDATION FORM
   - ✓ The Duke Nomogram
   - ✓ An EKG tracing

   Cut the EKG illustrating the patient's MI [e.g., inferior, anterior, etc.] and paste /tape it on a separate sheet of paper. Discuss it briefly with the information in your Item 1 summary [*Medical History*] and MSET data.
7. The materials for your case study will be handed in to me at the time of your presentation. This means that you must have two [2] copies, one for me and one for yourself during your presentation. They must be exact duplicates.
8. There is no word or page requirement for this assignment. Our goal is a thoughtful, thorough and well - prepared presentation.
9. There is no time limit on your presentation, but such reports have, in the past, seldom exceeded 20 minutes. This is not a requirement.
10. This is not an adversarial task, but a discussion between colleagues.

683 CASE STUDY PRESENTATION RUBRIC

This presentation addressed all 10 case study items in a thorough fashion. 7 8 9 10	The completed case study report is well-written, informative, and interesting. 7 8 9 10	The report includes all required forms and related information. 7 8 9 10
Two copies of the report, related forms, and materials were prepared and ready. 7 8 9 10	The report is neat, well – organized, clearly labeled, and stapled. 7 8 9 10	The illustrations are clearly edited and were integrated well into the presentation 7 8 9 10
Presenter spoke clearly and presented a professional appearance. 7 8 9 10	Presenter prepared with pen/pencil, paper, calculator, necessities? 7 8 9 10	Case Study Items were omitted. Yes No
Presenter was punctual and organized from the start. 7 8 9 10	The report exceeded normal requirements. 7 8 9 10	Spelling errors were noted. Yes No
Presentation was 15 to 20 minutes in duration. 7 8 9 10	Presenter, CASE, class, and date clearly identified. 7 8 9 10	Data and/or calculation errors were noted. Yes No

Is the presenter on time? Yes No

Materials and Case Study Format Forms

The Long Sheet	Yes	No
The Duke Nomogram	Yes	No
The RECOMMENDATION FORM	Yes	No
EKG illustrating MI location	Yes	No
✓ Accurately illustrates the MI location	Yes	No

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RUBRIC DATA ITEMS

1. **The Long Sheet**

   APHR: 100% _____ 85%_____ 70%_____

   Pretest data: _____ RPP _____

   Test data: _____ MET level _____

   15 minute test _____ VO_2 level _____

   Stopping Codes: _____ MHR%APHR _____

   1, 2, 4, 6, 8, 10' recovery _____

2. **Duke Nomogram**
   - ✓ Clearly labeled and illustrated

3. **RECOMMENDATION FORM**
   - ✓ John or Jane Doe
   - ✓ Form completed appropriately

4. **EKG tracing/illustration**
   - ✓ Twelve [12] lead
   - ✓ Clearly illustrates the MI location mentioned in the Medical History.
   - ✓ Accurately illustrates the described MI location.

5. **Summary comment:**

COMPLETION OF RUBRIC FORMAT

II B. LEARNING OUTCOMES **[continued]**

A summary of the following elements is provided with the **Program Assessment Worksheet** and **Chart 1 Assessment Summary** in **Appendix I:**

- ☐ student learning outcomes
- ☐ responsible person
- ☐ assessment tools/measures
- ☐ standards/benchmarks
- ☐ results/analysis
- ☐ action taken

Assessment of Student Outcomes [Chart I]

Chart I Assessment Summary in **APPENDIX I** provides a detailed summary of **Student Learning Outcomes: Assessment Tools, Standards/Benchmarks, Results/ Analyses**, and subsequent **Actions Taken.** An examination of **7. Technical Skills** in **Chart I** demonstrates one application of an outcome assessment:

Verification procedures [**Assessment Tool**] for teaching students blood pressure [BP] measurement procedure. A teaching stethoscope permits faculty to monitor the accuracy of student BP measures. A *Verification record* [**Standards/ Benchmarks**] is maintained until an appropriate *Clinical skill level is achieved* [**Results/Analysis**]. When a student is considered qualified to monitor BP, they are given a *Clinical assignment* [**Action Taken**] as a staff member.

Students must be able to measure blood pressure skillfully. They must then be able to relate their findings to patient clinical interventions and outcomes. They must know, be able to interpret, and be skilled in applying the standards in **Table 3.1** below.

TABLE 3.1. CLASSIFICATION AND MANAGEMENT OF BLOOD PRESSURE FOR ADULTS[a]

BP CLASSIFICATION	SBP mm Hg	DPB mm Hg	LIFESTYLE MODIFICATION	INITIAL DRUG THERAPY: WITHOUT COMPELLING INDICATION	INITIAL DRUG THERAPY: WITH COMPELLING INDICATIONS
Normal	<120	And <80	Encourage		
Prehypertension	120–139	Or 80–89	Yes	No antihypertensive drug indicated	Drug(s) for compelling indications[b]
Stage 1 hypertension	140–159	Or 90–99	Yes	Antihypertensive drug(s) indicated	Drug(s) for compelling indications[b] Other antihypertensive drugs, as needed
Stage 2 hypertension	≥160	Or ≥100	Yes	Antihypertensive drug(s) indicated Two-drug combination for most[c]	

BP, blood pressure; DBP, diastolic blood pressure; SBP, systolic blood pressure.

Adapted from National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7)*. 2003; 3:5233.

[a]Treatment determined by highest BP category.

[b]Compelling indications include heart failure, post–myocardial infarction, high coronary heart disease risk, diabetes, chronic kidney disease, and recurrent stroke prevention. Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mm Hg.

[c]Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

Adapted from National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7)*. 2003;3:5233.

1. 1. Student performance is also assessed in the following ways:
(1) Routine examinations and writing assignments in each course.
(2) Students are evaluated on their performance in research projects, class workshop assignments, class team presentations, independent studies, objective exams, class staff meetings, case study presentations, individual presentations to their classmates and to Diabetes Exercise and Cardiac Rehabilitation Program patients, to medical center programs, and community groups.
(3)Their performance in the internship and thesis preparations are major considerations.
(4) A student's performance in his/her assignment as a Teaching Assistant is observed. Particular attention is devoted to their progress in developing the *clinical attitude* and the *scientific attitude.*
(5) Students are required to have a 3.0 GPA prior to their internship assignment.
(6) A comprehensive oral examination must be passed in the presence of a graduate faculty select committee prior to graduation.

1. 2. Program quality is assessed in the following ways:
(1) Students evaluate professors at the completion of each course.
(2) Students evaluate course content at the completion of each course.
(3) Students rate the achievement of course objectives.

(4) The Division Chair evaluates faculty teaching, advising, scholarly activity, university service, and community service annually.
(5) Dialogue with program graduates and their employers as well as extensive input from internship supervisors and a growing network of SOK program graduates permits feedback for evaluating program content and effectiveness.
(6) Involvement with the Centers for Disease Control, the American Association for Cardiovascular & Pulmonary Rehabilitation, American Diabetes Association, the American College of Sports Medicine, the National Athletic Trainers Association, the American Heart Association, and collaboration with the conference planning committees and grant applications for the School of Nursing and Health Professions keeps the faculty apprised of clinical standards and guidelines for excellence in medicine and allied health that includes health promotion, disease prevention, and rehabilitation.
(7)Our involvement with the Diabetes Treatment Center Education Program includes the exchange of speakers for our respective programs and for Grand Rounds.
(8)A systematic review of the medical literature permits us to be informed of current medical opinion and incorporate same into the program [e.g., Adult Treatment Panel III, The Metabolic Syndrome, The JNC VIII Report is anticipated, emerging cardiovascular disease risk factors].

1. 3. Core course objective achievement is assessed in the following ways:
Curriculum core course objective achievement is assessed. Student responses are especially valuable; they provide insights to learning objectives not available from University surveys. See **Figure 1 and Table 4** below for this information. These data provide confirmation when we are on track with our course content and learning strategies. They also give us insights to course and program revision considerations.

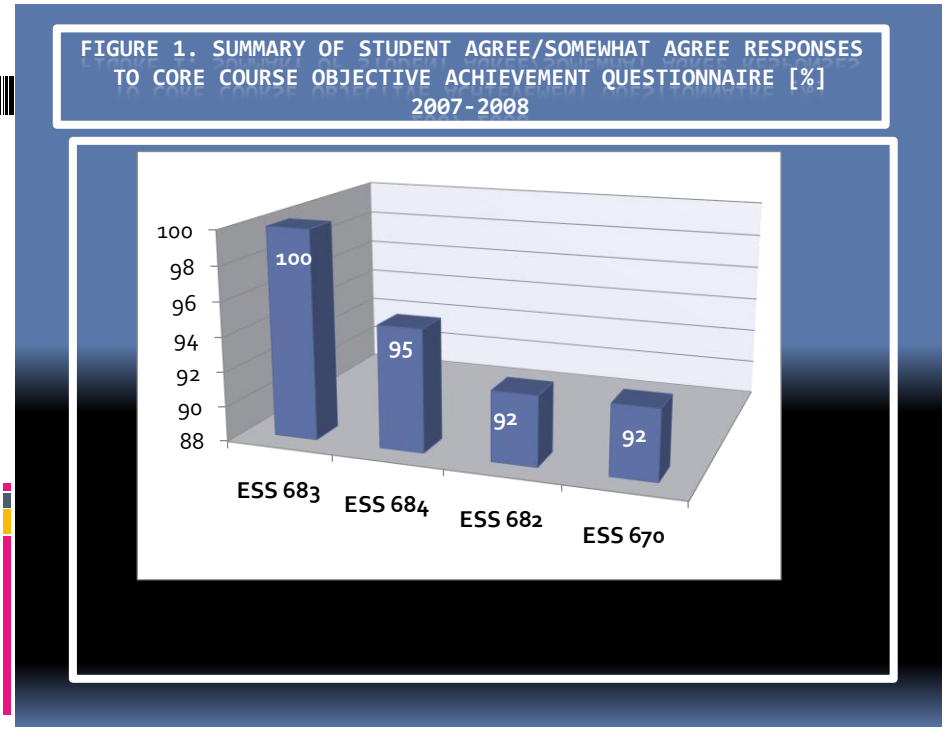

Table 4. ESS 682 Health Promotion and Disease Prevention [N=16] Summary of Student Responses To Course Objective Achievement [Spring 2009] Did this course achieve the following objectives?

OBJECTIVE	AGREE/SOMEWHAT AGREE COMBINED	SOMEWHAT DISAGREE	DISAGREE
1. To learn policies and procedures for Phase I, Phase II, and Phase III – Long-term Cardiac Rehabilitation [CR] Programs	**16**	√	√
2. To develop an appreciation for the recommended continuum of care for CR services	**16**	√	√
3. To assist you in developing an appreciation for CR guidelines	**16**	√	√
4. To assist you in developing skills necessary for managing therapeutic lifestyle change [TLC] interventions	**15**	**1**	√
5. To assist you in developing skills necessary for managing multifactorial therapeutic lifestyle change [TLC] intervention programs	**16**	√	√
6. To sharpen your screening, stratification, and risk stratification skills	**16**	√	√
7. To begin developing your six sigma leadership style	**16**	√	√
8. To assist you in examining the role of CR in rehabilitation and preventive medicine	**16**	√	√
9. To assist you in examining the rationale for CR	**16**	√	√
10. To sharpen your skills in managing case studies and medical profiles	**16**	√	√

1. 4. How assessment data are used to improve program quality:

(1) An ongoing program of self-appraisal by the faculty includes verbal and written observations by students during exit interviews as well as by internship supervisors and the other sources noted in Sections 5.a. and 5.b. Four [4] specific examples from the past 5 years illustrate direct applications for improving program quality. They include:

I. The Human Performance Laboratory Internet Website: a work in progress
II. A Sympodium Interactive Pen Display was recently added to the state-of-the-art audiovisual unit in the HPL classroom that already includes DVD/VCR and Power Point adaptations with its Internet access
III. The application of innovative teaching strategies
IV. Funding of a graduate Teaching Assistant position in addition to the already established Senior Clinical Exercise Physiologist [CEP] position.

2. Faculty Development Outcomes:

2.1 Tenure track faculty with or actively working on terminal degrees will teach 100% of courses in the program.

2.2 Professionals from clinical settings in the region and program graduates are an important resource as guest speakers.

2.3 Tenure track faculty will maintain current knowledge in their areas of expertise by attending and actively participating in meetings of scholarly societies. This would include publications in professional journals and other scholarly contributions to the program and community [e.g. newspaper articles about current topics]. See **Table 3** above.

3. Curriculum Outcomes:

3.1 The MS Exercise Science program conducts continuous review of the curriculum based on the perception of students in the program and its graduates. This information will be obtained through the use of:

- ✓ Student evaluations for each course
- ✓ Exit evaluations of the program following oral examinations
- ✓ Surveys sent to program graduates
- ✓ Surveys sent to employers of program graduates
- ✓ Surveys sent to internship site supervisors
- ✓ Discussions with students, graduates, faculty, and employers

3.2 The curriculum is reviewed annually relative to current opinion . This includes consistency of the program with standards of professional societies and accrediting agencies such as the *American College of Sports Medicine*, the *American Association of Cardiovascular and Pulmonary Rehabilitation*, and the *American Diabetes Association.* Literature reviews, with special reference to the *New England Journal of Medicine* and *Journal of the American Medical Association* are also important sources for maintaining the clinical relevancy of our program.

4. Course Outcomes:

4.1 Student evaluations for each course.

4.2 Student assessment of course objective achievement for each course.

4.3 Individual student conferences.

4.4 Class discussions of course objectives.

4.5 Oral examinations with carefully structured objectives.

III. IDENTIFY MEASUREMENT INSTRUMENTS:

1. Programmatic Instruments:
See the attached **Program Assessment Worksheet** and **Chart 1 Assessment Summary**

.

2. **Course Related Instruments:** See current course syllabi.

IV. THE REVIEW PROCESS:

The review process is ongoing and findings with merit are implemented in the next course offering. Relevance to current opinion in the field and to accrediting agency requirements is considered on a regular basis. Examples are requirements for successful completion of American College of Sports Medicine certification for *Certified Exercise Specialist* and *Certified Clinical Program Director*. Other considerations are the professional certification of our Cardiac Rehabilitation Program by the American Association of Cardiovascular and Pulmonary Rehabilitation and the professional certification of our Diabetes Program by the American Diabetes Association. Publication of revised "Lipid Management Guidelines" by the Adult Treatment Panel III and the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure in the *Journal of the American Medical Association* required implementation in many courses. We also annually implement the Clinical Practice Recommendations of the *American Diabetes Association* in our courses and clinical programs. Students are expected to use these screening and case management guidelines in their classes, internships, the clinic, and on-the-job.

V. DATA COLLECTION:

Data have been collected by telephone, electronic surveys, and personal interviews over the past year. An informal dinner meeting of several former graduates at ***King's Daughters Heart and Vascular 2009 Conference*** where I was a guest speaker proved especially valuable. Former students also call for consults concerning clinical procedures, program development, professional development, and when making career decisions. These discussions are especially valuable.

I also invite former students now in professional settings to return as guest speakers for my classes. Their presentations provide valuable insights to their career progress and professional career settings. We also usually have dinner beforehand and this permits meaningful discussion and career updates. Speakers have included graduates on staff at the School of Medicine of Johns Hopkins University, Cleveland Clinic Foundation, Southern Ohio Medical Center, Charleston Area Medical Center, High Intensity Training Centers, Inc., Merck Pharmaceutical, and Medtronic, Inc. Our current network is rather extensive and we use my website www.marshall.edu/coehs/hpl as another vehicle for communication.

Employers also contact me for advice and as a source of employee references. Many times, I will be able to provide them with a timely employee contact from our graduate pool. These discussions are also informative.

VI. DATA ANALYSIS:

The data analysis is ongoing. The most recent comprehensive formal data analysis was a five-year study completed in 2008 for the **Program Review** submitted to the Marshall University Board of Governors [See Introduction, page 1].

VII. ACTION TAKEN:

Program and curricular content is revised on a regular basis. Major revisions were made in the Exercise Science section of the Graduate Catalogue this past year to reflect curriculum changes. This included a name change. The Division of Exercise Science, Sport, and Recreation became the **School of Kinesiology**.

ESS 684 and 685 were dropped from the Clinical Applied Area of Emphasis curriculum and HCA 600 and ESS 623 were added. ESS 623 was also added to the Exercise Physiology Area of Emphasis. Several courses were added as **Restricted Elective** options in response to an extensive survey of our graduates and their employers.

Graduate and employer responses to our questionnaires revealed a high level of satisfaction with the program. See **Tables A, B,** and **C** in **APPENDIX II.**

For actions taken, responses to graduate and employer observations, See **Tables 6A, 6B, 6C,** and **6D** in **APPENDIX III**:

- **Table 6A:** Graduate Exercise Science Program Exit Survey: Valuable Academic Experiences
- **Table 6B:** Graduate Exercise Science Program Mailed and Electronic Questionnaire Responses: Valuable Academic Experiences
- **Table 6C:** Graduate Exercise Program Exit Survey Responses: Suggestions for Program Modifications/Improvements; With Dr. Marley's Responses Regarding Implementation
- **Table 6D:** Graduate Responses to Mailed and Electronic Questionnaires: Suggestions for Program Modifications/Improvements; With Dr. Marley's Responses Regarding Implementation

APPENDIX I.
ASSESSMENT WORKSHEET/CHART I

Program Assessment Worksheet

Measuring Instruments

Department: GRADUATE EXERCISE SCIENCE PROGRAM [SOK]

Degree: AAS:_____;Certificate:_____;BA:_____;BS:_____;MA:_____;MS: √___;

Program: MS – Exercise Science CIP CODE:_____

Date Completed:_____

*Code: F=Formative Assessments; S=Summative Assessments; VA+Value Added Assessments

Assessment Measures: Local Major Codes in Program:

	EXERCISE SCIENCE			
***Internal Measures**				
1. Written Examinations	S			
2. Quizzes	S			
3. Faculty Evaluations	F			
4. Oral Presentations	S			
5. Oral Examinations	S			
6. Discussion Groups	S			
7. Focus Groups	S			
8. Pre/Post Tests	S			
9. Student Satisfaction Surveys	F			
10. Case studies	S			
11. Standardized Tests	S/F			
12. Observation	F			
13. Internet laboratory assignments	S/F			
14. Library reserve assignments	S			
15. Comprehensive Examinations	S			
16. Clinical writing assignments	S			
17. Workshops	S			

18. Thesis	S			
19. Internship	S			
20. Abstract preparation	S			
21. Annotated reports	S			
22. Laboratory assignments	S			
23. Term papers	S			
24. Professional meetings	F			
25.				
****External Measures:**				
1. Graduate Surveys	F			
2. Interviews	F			
3. Employer Surveys	F			
4. Professional Group Recommendations	F			
5. Accrediting Organization	F			
6. Focus Groups	F			
*****Value Added**				
Work experience:				
1. Teaching Assistant	F			
2. Internship	S			
3. Independent Study	S			
4. Volunteer in clinic	F			

CHART I: ASSESSMENT OF STUDENT OUTCOMES

Chart I below provides a detailed summary of student outcomes and subsequent **Actions Taken**. An examination of **7. Technical Skills** Demonstrates one application of our outcome assessment procedures. *Verification procedures* [**Assessment Tool**] for teaching students EKG monitoring skills utilizes dynamic scope traces, static traces, telemetry traces, and monitor summary reports with accompanying traces. A *Verification record* [**Standards/Benchmarks**] is maintained until an appropriate *Clinical skill level is achieved* [**Results/Analysis**]. When a student is considered qualified to monitor an EKG, they are given a *Clinical assignment* [**Action Taken**] as a staff member. This may include our periodic routine clinical monitoring schedule as well as monitoring to assess any clinical changes related to observed signs and symptoms.

Chart I Assessment Summary
Marshall University
Assessment of Student Outcomes: Component/Course/Program Level
Component Area/Program/Discipline: Exercise Science

Component / Course / Program Level					
Student Outcome	**Person or Office Responsible**	**Assessment Tool or Approach**	**Standards/Benchmark**	**Results/Analysis**	**Action Taken**
1. Admission Competencies	Program Director	UG – GPA Science background Consider GRE scores; interview; letters of rec.	3.00 GPA Full Admission UG Exercise Physiology, Fitness Assessment, Kinesiology; science background	Annual and 5-year program growth and percent of graduates working In Field or Allied Field.	Establish more rigid entrance criteria and increase rigor of Exercise Science curriculum
2. Statistical Analysis	Program Director, course instructors, oral exam committee	ESS 670; EDF 517, 621, 625; PSY 623, 624; MGT 500, MKT 683	Successful completion of course work. Successful completion of oral examination.	Course application; student performance on oral examination.	Show students relevance in field and patient outcome data management
3. Research Design	Program Director, course instructors, oral exam committee	ESS 670; EDF 517, 621, 625; PSY 623, 624; MGT 500, MKT 683	Successful completion of course work. Successful completion of oral examination.	Number of student passing courses. Student performance on oral exam .	Program management:: minimize variance and maintain quality control
4. Related Literature	Program Director; advisors, course instructors, oral exam committee.	ESS 621, 623,670, 682, 685; student literature reviews; comprehensive oral examination.	Successful completion of course work, internship/thesis, and comprehensive oral examination.	Number of students completing program. Student performance on oral examination.	Implement current medical opinion: ATP III, JNC VII; ADA Clinical Practice Guidelines & benchmarking
5. Clinical Skills	Program Director; advisors, course instructors, oral exam committee.	ESS 601, 621, 683, 682, 687, COUN 577, 555, internship, thesis; oral examination	Successful completion of course work, internship/thesis. Pass comprehensive oral examination.	Performance in classes, internship & related tasks, quality of thesis, and oral examination performance.	Medical Profile Test Development & Case Management training; Cases assigned.
6. Best Practices	Program Director advisors, course instructors, oral exam committee.	All course work, internship, thesis, and oral exam; EKG and ACLS Courses at the Medical Center.	Successful completion of course work, internship [site], thesis, & pass comprehensive oral examination.	Performance criteria standards achieved in classes, internship, thesis, & oral examination.	Application of screening, stratification, variable categories/risk stratification with internship/thesis.
7. Technical Skills	Program Director; advisors, course instructors, oral exam committee.	ESS 601, 621, 682, 683, 687 internship, oral exam; EKG/ ACLS Courses Med. Ctr.Verification procedures.	Successful completion of course work and internship. Pass oral examination. Verification record.	Performance in classes, internships, and oral examination;clinical skill achieved.	EKG, BP, blood glucose, MSET, ACLS, patient management skills: clinical assignment.
8. Graduate satisfaction	Program Director	Questionnaire survey; personal interview; network	Graduate satisfaction ratings from questionnaires/interviews.	Questionnaire and interview data	Revise program content, website, & guest speakers
9. Employer satisfaction	Program Director	Questionnaire survey; personal interview; network	Employer satisfaction ratings from questionnaire/interviews.	Questionnaire and interview data	Revise program content, website, & guest speakers.

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APPENDIX II. GRADUATE AND EMPLOYER PROGRAM SATISFACTION

Graduates:

Responses from 94 recent graduates indicated that 95% of them felt they were, "significantly well-prepared/ well-prepared," by their graduate curriculum and related experiences in the Exercise Science Program [**Table A**]. These graduates have competed successfully with candidates from other universities for professional positions, advanced graduate degrees, medical school, physician assistant programs, physical therapy school, and other allied professional careers regionally and across the country [See Table 8. Current Positions for Exercise Science Masters Graduates.

Table A. How Well Were You Prepared for Employment by the Exercise Science Curriculum? [N = 94]

Significantly Well Prepared	Well Prepared	Marginally Prepared
54	35	5

EMPLOYERS:

Table B summarizes 31 responses to our Employer Survey. Their responses to the question, "How do you rate the overall quality of these graduates in your employment during the past five [5] years?" Ninety-seven [97]% of the respondents rated our students **Above Average/Superior**; 48% rated them **Superior.** The **academic preparedness** of these same students for employment [**Table C**] was judged as **Significantly Prepared** to **Extremely Prepared** by 27 of 31 [87%]

Table B. Quality of MU Exercise Science Graduates In Your Employment

Average	Above Average	Superior
1	15	15

respondents to our employer survey. The student rated "very unprepared" was considered of "Superior" quality, with no explanation given for the disparity. This may have been an employer of one of our 4 students changing careers.

Table C. How Well Were MU Exercise Science Graduates Prepared for Employment

Very Unprepared	Somewhat Prepared	Significantly Prepared	Extremely Prepared
1	3	10	17

APPENDIX III : SURVEY RESPONSES AND DR. MARLEY'S RESPONSES

Table 6A. Graduate Exercise Science Program Exit Survey Réponses: Valuable Academic Experiences

1. Excellent professors with strong knowledge and backgrounds.
2. The internship requirement combined with great internship opportunities.
3. Very strong; all areas are strong.
4. Very good program; feel confident in the knowledge I have gained.
5. Professors are very knowledgeable and care about the students, especially the GAs.
6. Good professors and variety of courses.
7. The overall knowledge of the faculty.
8. Knowledgeable professors, class size, subject material; enjoyed my experience.
9. Therapeutic exercise equipment available for classes.
10. Curriculum covers a variety of subjects.
11. The laboratory experiences and hands on helps with the learning process.
12. The program is well-organized and makes great efforts to educate and prepare its students for our profession.
13. The faculty is very well-organized and extremely knowledgeable in each of their specialties; they are also available for advice and consultation. .
14. Advanced Cardiac Life Support class was a big help. .
15. Professors take the time to help students understand concepts.
16. Good professors who care about their students.
17. Faculty has extensive knowledge in their fields of study.
18. My life experience was great here.
19. I would recommend the program to any student.
20. This program was a tremendous Master of Science program. Strengths include:
    - ☐ Fantastic professors that took the time to teach on a master's level, yet communicated in ways so the individual student could understand.
    - ☐ I would recommend this program to any student.
21. Strong program; excellent teaching, very thorough with materials and points of study.
22. I was very impressed with the education and teaching of the instructors in my field.
23. Professors were very helpful in and out of the classroom
24. A huge asset that Marshall University has to offer that not all schools offer is the Graduate Assistantship Program and the priceless experience you get while also receiving your masters degree.

25. The strength of the faculty; a fine resource.
26. Knowledgeable professors, high level of challenging and varied coursework.
27. I really like the fact that there is a small teacher/student ratio. That allows individualization. I also like how teachers are willing to let the graduate student tailor assignments to their area of interest.
28. There was some conflict of exercise physiology students having to take clinical and cardiac rehabilitation area courses; personally, I thought I'd say that, for me, they were beneficial. Thank you.
29. The emphasis on cardiac knowledge; hands on experience with exercise testing.
30. The faculty are knowledgeable and very helpful and responsive to students. This is a fantastic, standout program that is recognized and respected thanks to the faculty and success of its students.
31. Faculty is wonderful and very helpful; professors want you to learn and achieve your goals.
32. Interaction with professors, class size.
33. I really feel like I learned from this program and was able to understand which helped in my internship.
34. Professors are kind and knowledgeable. Classes are interesting and practical.
35 I got along with all the professors; they were all professional and approachable.
36. Knowledgeable staff who were challenging. Acquired a lot of information while pursuing this degree. GA position prepared me well for future employment.
37. Diabetes Exercise and Cardiac Rehabilitation Center; Dr. Marley and Dr. Martin: find them help to decrease their time spent away from the classroom; let them do what they do best, teach.
38. The curriculum covers all areas of exercise physiology.
39. Highly recommendable program.
40. Experience of the faculty; their applied knowledge.
41. Overall great experience.
42, Very beneficial; great professors with experience in their fields.
43. Knowledge of the faculty.
44. The program goes beyond the basics, offers a strong faculty and great opportunities for internships.
45. Emphasis on the scientific literature; integration of research/current opinion into courses.

Table 6B. Graduate Exercise Science Program
Mailed and Electronic Questionnaire Responses:
Valuable Academic Experiences

1. "I must say that the entire program …directed by Dr. Marley was invaluable to me in my professional pursuits, both at the Cleveland Clinic and with Medtronic's Cardiac Rhythm and Disease Management Division. His program was far superior to anything I had encountered as an undergraduate at the University of Southern California, with respect to exercise science. Aside from the clinical education I received from Dr. Marley, he also sought to educate us in professional conduct, something that set me far above my colleagues when I entered the professional arena…. Specifically, courses ESS 683 and ESS 685 were very valuable to me."
   - Comments by a graduate entering the Joan C. Edwards Marshall University School of Medicine, Class of 2012.
2. "The clinical experience I received as a graduate assistant as well as in my internship was extremely valuable. This experience ,,, allowed me to interact with patients and health care providers on a daily basis. The skills I gained… helped pave the way for my success in my current position. In ESS 682, we reviewed and dissected relevant medical literature. We learned how to effectively read a clinical reprint. This training has proven extremely valuable in my current position as an executive in the pharmaceutical industry."
3. "I just wanted to … thank you for all you have done for me. I am currently a first year medical student at _____. I not only want to thank you for writing me a letter of recommendation, but for all the knowledge you shared with me over my time in your program. You prepared me not only academically for medical school, but professionally as well. Medical school is very demanding, but very rewarding at the same time. I look forward to studying the cardiovascular system in medical school. I am so thankful for everything you taught me regarding lipid profiles, EKGs, and many other cardiac and related diseases.Thank you again for everything."
4. "The cardiac rehabilitation courses demonstrated just how hard one would have to work to be successful."
5. "I believe the most helpful part of the program was the class work. I did not realize until I began working how much correlation there was between my job knowledge and the material in class….Dr. Marley's example set the tone for my performance. He expected our best in class and laid the groundwork for my professional pride and making sure co-workers, patients, etc. know they can count on my knowledge and skills to get the job done. As he said many times, "This is what we do."
6. "Dr. Marley clearly stressed professionalism in each class. My graduate assistant experiences allowed me to practice my communication and leadership skills, providing an excellent

foundation for my successful professional career in the pharmaceutical industry."

7. "By far, the clinical experience I gained by working as a graduate assistant in the Diabetes Exercise and Cardiac Rehabilitation Center in the Human Performance Laboratory has been the most valuable aspect in my academic preparation for medical school. A close second would be the use and interpretation of EKGs in ESS 683 Cardiovascular Assessment and HPL Clinic…. I would not be in medical school today without the preparation and experience gained as a Graduate Assistant in the Diabetes Exercise and Cardiac Rehabilitation Program. "
   - ❑ Third Year Medical Student, Joan C. Edwards Marshall University School of Medicine.
8. "The most valuable course for me, in preparing for my current Research Associate position, was Dr. Marley's ESS 670, Research Methods; my internship at Cincinnati Children's Hospital in the Cardiology Department was a primary factor in my choice of a career in medical research."
9. The internship was cited by numerous graduates as either the most or one of the most valuable experiences in preparing for professional employment in the clinical setting.
10. Graduate Assistant experience was also cited by numerous graduates as either the most or one of the most valuable experiences in preparing for professional employment in the clinical setting. One graduate commented: "The most valuable aspect of the Graduate Exercise Science Program at Marshall University has been its ability to provide a unique clinical experience through the Diabetes Exercise Center. After participating as a GA in this program for 2 years, I found that I was prepared to enter any clinical exercise physiology position."
    - ☐ Graduate currently completing his Doctor of Physical Therapy degree at WVU.
11. "Dr. Marley's lectures, particularly those related to cardiovascular disease and diabetes were valuable."
12. "…the clinical aspect along with the management aspect were balanced well in the curriculum. My Graduate Assistantship in the Diabetes Exercise and Cardiac Rehabilitation Center with Dr. Marley was vital to my education. I wish that all the students could be GA's in the Human Performance Laboratory Programs…this is what really helps pull things together. It really helped me prepare for my work as a Physician Assistant….And I am doing it with great joy by the way."
    - ❑ A Board Certified Physician Assistant currently practicing in Florida.
13. "…working as a Graduate Assistant in the Diabetes Exercise and Cardiac Rehabilitation Program, my internship, and Dr. Marley's leadership."
14. "There were many valuable aspects of the program that prepared me for my career. First, was Dr. Marley's clinical expertise….Second the graduate assistantship experience …in the Diabetes Exercise Center….Lastly, was my clinical internship at the Cleveland Clinic Foundation, an experience that allowed me to put a capstone on my graduate studies."

15. “The exercise science program has helped me to improve my knowledge and…my clinical skills needed for PA school and clinical practice….in PA school I utilize my knowledge on a daily basis regarding EKGs, cardiac enzymes, treatment options for cardiac patients…and many other valuable tools I learned from my professors at Marshall University. It was much easier for me to learn certain things in PA school because of the background knowledge and experience I gained at Marshall….My advisor was instrumental in my career choice.”
    - A student currently in the Physician Assistant Program at the Bowman Gray School of Medicine of Wake Forest School of Medicine.
16. “My graduate assistant position at the Diabetes Exercise/Cardiac Rehab Center, ACLS course, Exercise Testing Course.”
17. “The internship and the use of graduates as peer mentors [guest speakers for class], professors were easy to access and available, and still are whenever I need any assistance. At the St. Louis School of Chiropractic Medicine, my education in the Graduate Exercise Science Program allows me to be more prepared than others in my class.”
18. “Dr. Marley’s ESS 683, Cardiovascular Assessment, was very beneficial. Dr. Marley has been an excellent mentor and excellent communicator after graduation. During my time at Marshall, he went above and beyond what is normally expected of a professor. He has been a role model of mine since 1998.”
19. “Dr. William P. Marley, Dr. Terry Shepherd, and Dr. Dan Martin were exceptional teachers during the course of my study in the Graduate Exercise Science Program. Their knowledge is second to none. Their advice and guidance during my time in the program has helped shape my career.”
20. “I would have to say the faculty during my tenure in the program was exceptional in their teaching skills and their clinical and professional knowledge was shared in such depth that it has allowed me to achieve success in a large allied health administrative position.”
21. “I believe our program prepares students to enter the clinical setting with superior knowledge and confidence. I can never thank you enough….”
22. ”I have fond memories of my academic career and recommend the program to others. I believe our students are well-prepared and superior to similar programs. Thank you.”
23. “”The program offers great ‘hands on’ opportunities to students – it is definitely the strong point of the program and should remain so. This separates our program from others….
    - This comment from a former Graduate Assistant in the Diabetes Exercise and Cardiac Rehabilitation Center.
24. “The most valuable aspect of the Program for me was the diverse background we received in disease processes and complex patients with multiple comorbid disease.”
25. “My current position is administrative. However, my clinical background through education in

the Exercise Science Program and my clinical experience there provided me with this opportunity. My training in the Program provided me with the opportunity for my first position in the clinical setting; the exposure to research methodology and procedure has given me the ability to stay on top of things in my allied medical field."

26. "The most valuable aspects of the exercise science program were ESS 682, 683, 684 and 685…."

Table 6C. Graduate Exercise Science Program Exit Survey Responses: Suggestions For Program Modifications/Improvements; With Dr. Marley's Responses Regarding Implementation

1. Stop teaching to the weakest links; demand that students pursue academic excellence at the next level, as Dr. Marley teaches.
   - Response: This concern has become more challenging in recent years; one strategy that has proven effective is the workshop technique and the use of stronger students as "peer mentors."
2. Perhaps an emphasis on applications of strength and conditioning; that should include a professor with a Ph.D. and CSCS certification who can teach ESS 642 and possibly one additional course. .
   - Response: Because of position cutbacks and an inability to compete salary-wise in the job market, this request could not be satisfied with Dr. Chandler's departure. We have, however, recently hired a Ph.D. with a specialty in Strength and Conditioning to address this concern.
3. Some classes are repetitive; cadaver class would be great.
   - Response: The curriculum is being streamlined and enhanced by agreement with other disciplines. This includes arrangements with programs in Health Care Administration, Counseling, and Biological Sciences.
4. Students need to be informed of proper course sequence so that an appropriate knowledge base is established for more advanced classes.
   - Response: This problem can easily be resolved with a personal interview; it usually occurs when a student is unable to schedule a personal interview and/or begins their program in the spring semester. The personal interview serves many purposes, including that of a graduate school orientation.
5. More classes should be offered.
   - Response: This request is being resolved by arrangement with other disciplines; for

example, students are enrolling in Health Care Administration, Counseling classes, and Molecular Biology classes relevant to their plan of study. It would be desirable to require Health Assessment, but we lack adequate staffing to teach the class.

6. We need more hands on work, too much classroom; we need more EKG instruction, work with telemetry, including the 12-lead, and metabolic cart.
   - Response: It is not realistic to expect these kinds of experiences to be provided in the classroom to the extent necessary for developing clinical acumen. Laboratory experiences with EKG telemetry, blood glucose monitoring, blood pressure assessment, and metabolic cart, are available in Human Performance Laboratory Programs and the Exercise Physiology Laboratory. Students can use these facilities outside class hours to develop their skills in these areas. One student suggested requiring laboratory hours and clinical time; again, this may not be realistic because of the nonresident nature of our student body. The clinical internship addresses these needs; student motivation to use available facilities and programs is a factor.
7. The program needs more professors; the current faculty is spread too thin.
   - Recent staffing additions have been aimed at addressing this concern of both students and faculty.

Table 6D. Graduate Responses to Mailed and Electronic Questionnaires: Suggestions For Program Modifications/Improvements with Dr. Marley's Responses Regarding Implementation

1. "Dr. Marley and staff gave me the knowledge and confidence…to excel in my internship and in the workplace….Many of the skills and practices I learned in Exercise Science classes, I used daily on the job in cardiac rehabilitation and I believe I made an easier transition to my job at the Cleveland Clinic than most of my colleagues from other institutions….There are no improvements that I could list at this time. It is my opinion that the clinical applied area of emphasis in the Graduate Exercise Science Program places graduates in a perfect position to gain immediate employment in the field."
2. More emphasis on communication and leadership skills.
   - Workshop sessions, spontaneous class presentations, lightening round discussions, and team presentations are aimed at developing these skills. These tasks have received increased emphasis in recent years.
3. Place more emphasis on medications, pharmacology, and pathology. .
   - ESS 687, Advance Life Support, addresses this concern in emergency medicine and a pharmacology course is now available for our students.

- Pathology is addressed to some degree in ESS 683; time limitations are a concern here.

4. "Communication was lacking in the Graduate College office and administration."
   - This concern has been resolved in great degree by having advisors work more closely with administrative staff and streamlining processing and entry procedures; the addition of an Admissions Recruiter for the Graduate Exercise Science Program by the Graduate School has been especially helpful .
5. "I wish that all the students could be GA's in the HPL as this is what really helps pull things together. The curriculum really prepared me for my current career as a physician assistant…."
6. "As I review the current website, it appears that my concerns have been addressed."
7. A course devoted to program development, business planning, budget management, and health care costs would be valuable.
   - I have made arrangements for our students to be enrolled in the School of Business course, Health Care Administration 600, to address this concern.
8. "I would change nothing about the program. I really appreciated the fact that the program molds to each individual when it comes to what they would like to do for their future career….I I really enjoyed the diversity of the program and its different areas of concentration."
9. "Achieve better support from the University." This echoed the thoughts of many respondents; their comments were more explicit.
10. "Consider ACSM certification as part of an existing course."
    - I have consistently introduced practice ACSM Certification Examinations in my classes and introduced concepts that prepare our students for such certification; remember, many of our students have also passed licensure exams as physicians, physical therapists, physician assistants, pharmacists, PTAs, and been certified in other clinical entities [e.g., ACLS, Respiratory Therapy]. In any case, our students have been very successful in passing ACSM certification exams; our most recent ACSM Certified Exercise Specialist is Rebekah Newman, MS, at the Cleveland Clinic Foundation Medical Center in Jacksonville FL.
11. "When recalling my experience in this program, I cannot truly think of any aspect that was lacking. Dr. Marley went out of his way to provide us with the most comprehensive education in cardiac rehabilitation/exercise physiology, given the resources available to him at that time. Since returning, I have seen the improvements to the education facilities in the Henderson Center [spearheaded by Dr. Marley]. It would have been nice to have those amenities when I was a student, however, while I was there Dr. Marley had been busy with improvements to the cardiac rehabilitation facility for the patients, and patients should always come first. I mean this with the utmost sincerity."