Instructor:  
Molly Bray, PhD  
Office: GEA 313C  
E-mail: mbray@austin.utexas.edu  
Phone: 512 471-3958

Course Description:  
This course will provide an overview of the science of nutrition. Topics covered include components of food (macro- and micronutrients), digestion and absorption, energy metabolism, energy balance, and the role of nutrition in the growing epidemics of obesity and chronic illnesses, including diabetes, coronary heart disease, and cancer. While the terms "nutrigenomics" and "nutrigenetics" are fairly recent, it has been known for decades that nutritional intake can modify the effect of genes. In this course, we will also cover basic gene structure and function, how traits are inherited, how genetic variation influences dietary intake, and how dietary intake, in turn, influences gene function. This course is designed to coalesce knowledge of nutritional biochemistry and metabolism and provide a framework for interpreting physiological outcomes in the context of gene-diet interactions.

Course Objectives:  
• Understand how the human body extracts and utilizes nutrients from foods for growth and maintenance of health.  
• Apply knowledge of metabolism and nutritional biochemistry to interpreting the validity of nutrition information.  
• Analyze patterns of dietary intake and determine how quantity, quality, and timing of meals influences energy balance and adiposity.  
• Evaluate whether and how information about genes, metabolites, proteins, and other "omics" measures, along with phenotypes and environments, can be used to create a personalized nutrition plan.

Required and Optional Texts and Readings:  
• Textbook  
• Optional Textbooks  
• Required readings  
  o Rosen ED and Spiegelman BM (2014) What We Talk About When We Talk About Fat, Cell, 156:20-44.  
  o More….

Course Requirements:  
The course will require the application of acquired nutrition knowledge to real-world issues in nutrition science. In addition to two comprehensive exams, a series of written short reports, along with a culminating final project will involve extensive critical thinking and writing, and the course will carry a writing flag.
• Exams
  o There will be two comprehensive exams (midterm and final), each worth 150 points.

• Provocative Question Discussion Boards (short answer; 8 discussion boards at 25 points each)
  o Each module (outlined below) will begin with a provocative question posed to the class to guide the learning for the given module. Students will provide their initial responses via short answers and peer review prior to learning. The following week, after learning relevant material, the students will revisit the question in a subsequent discussion board. Example questions are provided below:
    1. Should physicians be allowed to endorse nutrition-related products and supplements?
    2. Some have compared nutrition to religion. Why is a given diet (e.g., vegan, paleo, etc.) often associated with such strong convictions?
    3. Is breakfast the “most important meal of the day”?

• Written Myth Buster Reports (5 pages; 6 reports at 50 points each)
  o Students will be presented with a series of case studies focused on debunking a nutrition “myth.” The myth may be related to a nutritional product, a fad diet, or a commonly held belief about nutrition. Students will use their knowledge of nutritional biochemistry, metabolism, and molecular biology to determine whether to buy or bust the nutrition “myth.”

• Final project (10-15 pages, 400 points)
  o There are many products currently available on the market that provide gene-based, “personalized” nutrition recommendations and guidance. For this project, the student will choose a gene-based nutrition program that is currently on the market and perform a systematic evaluation of the program by answering the questions below. The student will create a summary report of this evaluation in a format that would be appropriate to give to a client or patient.

  Systematic Evaluation Questions
  1. What is the name of the company?
  2. How long has the company been in business?
  3. Who is/are the founder(s) of the company? Do the founder(s) have any scientific or clinical credentials related to nutrition?
  4. Do any of the personnel associated with the company have scientific or clinical credentials related to nutrition?
  5. What is the cost of the assessment(s) provided?
  6. Are any other products or services provided by the company?
  7. What kind of information is the client asked to provide?
  8. What kind(s) of sample(s) is the client asked to provide?
  9. How many genes/genotypes (SNPs) are utilized in creating the personalized program?
 10. Provide the following for three genes included in the genotyping panel:
      a. Name of the gene (and SNP, if provided)
      b. Chromosomal location of the gene and putative function
      c. Outcome associated with the gene/SNP (e.g., bitter taste)
      d. Evidence for the gene-outcome association (evaluate at least two studies supporting the association and be sure to include an assessment of analytical and scientific validity, rigor of the studies performed, and biological plausibility of the association).
 11. What kind of information is provided in the reports to the client?
 12. What is the evidence provided that the recommendations “work”?
13. Is/are the information and/or services provided by this company a good value for the client?

Final grades are based on 1,200 total points.
- Exams (midterm and final) 300 points
- Provocative question discussion boards 200 points
- Written case Study Reports 300 points
- Final Project: Personalized Diet Prescription 400 points
- TOTAL 1,200 points

Grade scale:
- A = 1075 - 1200 pts
- B = 955 - 1074 pts
- C = 835 - 954 pts
- D = 715 - 834 pts
- F = <715 pts

Course Topics
Part I – Nutrition Basics
  A. Introduction and Ethics
  B. Basics of a healthy diet
  C. The scientific method
  D. Interpreting nutrition information

Module II - Basic Nutritional Biochemistry
  A. Digestion and absorption
  B. Macronutrients
  C. Micronutrients
  D. Energy metabolism

Module III – Integration of Metabolism and Energy Balance
  A. Anabolism and energy storage
  B. Catabolism and energy utilization
  C. Adipogenesis (fat cell formation)
  D. Feeding and satiation
  E. Dysregulation of energy balance systems

Module IV – Nutrigenetics and Nutrigenomics
  A. Gene structure and regulation
  B. Inheritance
  C. Gene-diet interaction
  D. Personalizing nutrition
Brief Biography

Molly S. Bray, PhD
Professor and Susan T. Jastrow Chair for Excellence in Nutritional Sciences
Chair, Department of Nutritional Sciences

Dr. Bray holds the Susan T. Jastrow Endowed Chair in the Department of Nutritional Sciences at the University of Texas at Austin, with a master's degree in Exercise Physiology and a PhD in Human and Molecular Genetics. Dr. Bray's research focuses on the relationship between genetic variation, energy balance, and lifestyle factors such as exercise, nutrition, and circadian patterns of behavior. Work in her laboratory is designed to identify the mechanisms by which timing and quality of energy intake affects weight gain and metabolic health, in particular through intestinal absorption and the gut microbiome. Dr. Bray also currently leads one of the largest genetic studies of exercise adherence and dietary patterns established to date, the Training Interventions and Genetics of Exercise Response (TIGER) study, with a total cohort of more than 3,500 individuals. Dr. Bray's research has included investigations of aerobic fitness and resting and exercise energy expenditure in children and adolescents and clinical studies of morbidly obese adolescents undergoing bariatric surgery. She has over 125 peer-reviewed publications, as well as numerous published abstracts, invited lectures and seminars, and book chapters. Her non-academic interests/hobbies include hiking, tennis, reading, and cooking.