BISC 10j  Diabetes  Dr. Elaine Lai

Course Description:

The rising prevalence of diabetes has taken an alarming human and societal toll. Diabetes is becoming a national and global concern. This course explores the science behind Type 1 and Type 2 diabetes mellitus (T1DM and T2DM) plus gestational diabetes, the contribution of modern western lifestyle to disease development, the increasing rates of obesity and diabetes, current diabetes treatments including insulin and non-insulin drugs, artificial pancreas and bariatric surgery, future treatment such as stem cell therapy, the rising diabetes treatment cost and impact on current healthcare policy. Emphasis will be placed on discussion of molecular genetic research that has illuminated our understanding of the underlying pathophysiological mechanisms. A food lab is included to provide hands-on experience and to further inform about the importance of food and nutrition (together with exercise) in the management and prevention of T2DM.

This course meets the requirement as an area A elective (or a free elective) for HSSP BA students. It does not fulfill a requirement for the major in Biology. This course has been approved as an Oral Communication (OC) course.

Syllabus for the 2014 HSSP JBS (June 2 to July 25)

For this JBS, the course syllabus of BISC 10j has been planned in parallel with Professor Rosenfeld’s course syllabus of HSSP 120j, Health Care Landscapes. Professor Rosenfeld and I have integrated our two courses such that together they teach the biology and disease aspects (BISC 10j) and the social and health policy aspects (HSSP 120j) of diabetes. Instead of taking different final exams in each of these two courses, three student groups will develop their own menus and prepare diabetic-friendly meals, give public presentations and write “position” papers. The public presentations and final papers will be co-graded by both professors.

Classes meet on Tuesdays from 9:30-noon in __________, then 1-2 PM in __________, followed by Food Lab from 2-6 PM in Ridgewood Kitchen/Common Room (unless specified otherwise).

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TA: Kimi Van Wickle, BS in HSSP, Brandeis University. Office hours: or by appointment for one-to-one help sessions. E-mail: kvanwick@brandeis.edu

(3.5 hours class, 1 time/week, 8 weeks, total 28 hours; plus 8 Food Labs, each from 2-6 PM, total 32 hours.)

Assigned reading will be posted on LATTE or handed out in class. No textbook is assigned. Class format includes lectures, class discussions as well as group conference, group presentations, group cooking sessions and team working. Two guest lectures are planned.

**CLASS SCHEDULE. (CLASS MEETINGS FROM 9:30-NOON ON TUESDAYS.)**

Class 1. **June 3** The diabetes and obesity epidemics, and the biology of diabetes
   
   - What is diabetes?
   - Why is diabetes becoming a national and global concern?
   - The worldwide epidemiology of T2DM
   - Brief overview of health disparities

Class 2. **June 10** Diabetes treatment
   
   - Self-monitoring
   - Physician-monitoring
   - Insulin and non-insulin drugs (e.g. metformin, a biguanide, was previously reported to reduce glucose synthesis through activation of the enzyme AMP-activated protein kinase, AMPK. Current research suggests that metformin antagonizes the hormone glucagon).
   - Bariatric surgery to treat T2DM
   - Recent breakthroughs in diabetes treatment
     - Artificial pancreas
     - Gut enzyme
     - Fat blocker
   - New drugs in research and development
     - Can an old asthma drug (amlexanox) point the way to new treatments of diabetes and obesity?
     - Can a newly discovered hormone (beta-trophin) free diabetics from injections?

Class 3. **June 17** Diabetes prevention and health promotion by lifestyle intervention
   
   - Omega-3 polyunsaturated fatty acids and its beneficial effects on diabetes
Fructose consumption and insulin resistance

MyPlate, released in 2011, an educational tool that helps consumers implement the principles of the 2010 Dietary Guidelines for Americans

The merits of the Mediterranean diet

Exercise and physical activity

Advertising and health promotion

Class 4. **June 24**  Obesity

Obesity has become a global health problem and has emerged as the important contributor to ill health, displacing undernutrition and infectious diseases. Overweight people are twice as likely to develop type 2 diabetes as people who are not overweight. Type 2 diabetes is a major cause of early death, heart disease, kidney disease, stroke, and blindness. In the United States, the prevalence of overweight and obesity has increased dramatically jumping from one of every four Americans to nearly two of every three. The rising rates among children are especially disturbing.

Myths, presumptions, and facts about obesity (NEJM 368:5, 2013)

Factors in the Development of Obesity, a Multi-factorial Disease
- Biological factors. Emphasis will be placed on the discussions of obesity genes. These discussions will include the *fto* gene, *ob* gene, and genes encoding the neuropeptide orexin, POMC and BDNF, as well as encoding the POMC receptor MC4.
- Fat cell development: Hypercellular obesity, Hypertrophic obesity and Hyperplastic obesity (Hyperplasia)
- Adipose tissues: Subcutaneous versus visceral
- Sex and age
- Race and ethnicity

Social and Environmental Factors (Professor Rosenfeld will teach this topic)
- Socioeconomic status
- The built environment
- Social factors

Lifestyle and Behavior Factors
- Physical activity
- Psychological Factors

Health Risks of Overweight and Obesity with focus on diabetes

Obesity Treatments
- By prescription drugs
- By bariatric surgery

Obesity Prevention
- Weight management - What goals should I set?
- Adopting a healthy weight-management lifestyle
- Diet and eating habits
- Physical activity
- Thinking and emotions
- Weight management approaches

Class 5. **July 1**
What has science contributed to the understanding and treatment of diabetes?
Basic research: T1DM and genetic causes
T2DM and genetic causes
Susceptibility of T2DM detected by epigenetic tools
Stem cell research: Hope for cutting-edge treatment methods

Class 6. **July 8**
Each of the three student groups gathers to brainstorm and work on group project.
Instructor and Program TA will circulate between groups to answer questions.

(Date to be confirmed) Guest lecture by Dr. K. C. Hayes, Brandeis University. Title:
“From Fat Research to Smart Balance: Science at Work for Public Health”
Dr. Hayes will welcome questions from the class at the end of his lecture.

Class 7. **July 15**
Each of the three student groups gathers to brainstorm and work on group project.
Instructor and Program TA will circulate between groups to answer questions.

(Date to be confirmed) Guest lecture by _______________, Brandeis University. Title:
“The Nile Rat: a Novel Model for Nutritionally Induced Type 2 Diabetes”
________________ will welcome questions from the class at the end of his/her lecture.

**OUTLINES ON PUBLIC PRESENTATIONS ARE DUE TODAY TO BOTH DR. LAI AND DR. ROSENFELD.**

Class 8. **July 22** Class presentation on student-driven projects. Three student groups will give public presentations on race, culture, and the social and policy determinants of nutrition, obesity and diabetes. These presentations will include evidence-based critique of current science and policy solutions as well as new policy and program proposals.

**PAPERS BASED ON PUBLIC PRESENTATIONS PLUS “POSITION PAPERS” (SEE ASSIGNMENT, COURSE GRADING SECTION FOR DETAILS) ARE DUE TODAY AFTER CLASS PRESENTATIONS.**
**FOOD LABS**

Eight Food Labs (Tuesdays 2-6PM) in Ridgewood Kitchen/Common Room unless specified otherwise. Please bring your labcoat to every Food Lab.

**FOOD LAB SCHEDULE. (FOOD LABS MEET ON TUESDAYS FROM 1-2, THEN 2-6 PM.)**

**June 3**  Food Lab # 1: Vegetables provide good sources of fibers, vitamins, minerals and phytochemicals including antioxidants, which are all good for our health. We will begin our HSSP JBS Food Lab with our appreciation for fresh vegetables. Students will be preparing vegetarian eggrolls (Vietnamese Spring Rolls) and vegetarian sushi (California Rolls), followed by tasting.

**June 10**  Food Lab # 2: The Mediterranean Diet has been scientifically proved to be a heart-healthy diet. It is also recommended as a nutritious diet for people with diabetes. Students will be cooking a meal based on the principles of the Mediterranean Diet, which includes Slowly Cooked Salmon (recipe by Jacques Pepin), Corn and Black Bean Salad and Balsamic Fig Salad. This meal preparation will be a class joint effort. Then everyone can enjoy the fruits of our cooking experience together. The merits of this diet will be discussed in class before the Food Lab.

**June 17**  Food Lab # 3: We will prepare a scrumptious breakfast for diabetics. These recipes come from the cookbook “Eat to Beat Diabetes” by Robyn Webb. We will be baking or preparing as a class joint effort the following breakfast dishes: Summer Berry Muffins, Stuffed Eggs and Berry Salad with Passion Fruit (if passion fruit is not available, substitute with fresh peach sauce).

**June 24**  Food Lab # 4: Dietary proteins are either complete or incomplete, that is, whether the protein contains all the essential amino acids that our bodies do not make. We will focus on the preparation of dishes made with complete dietary proteins in this Food Lab. Our menu for a class joint effort lab includes Stir-fried Tofu with Chinese Mushrooms, Ginger, Scallions and Cilantro (my recipe) and Pomegranate Braised Chicken. These protein-rich dishes will be paired with Stir-fried Green Vegetables and Jasmine White Rice.

**July 1**  Food Lab # 5 on the topic of desserts: We will peel, cut, slice and taste different exotic fresh fruits as well as make ‘mousse au chocolat’ using a French mousse recipe. Can you substitute high-calorie, high-fat cakes with fresh fruits for desserts? I can because I grew up enjoying fruits for desserts. French foods tend to be high in fats like...
‘mousse au chocolat’ and foie gras, and yet French people tend to stay trim. What is their nutritional secret?

Group A discusses their cultural cuisine menu planning with instructors
The other groups work on their menu planning.

**July 8**  Food Lab # 6: Cultural cuisine prepared by Group A
  Group B discusses their cultural cuisine menu planning with instructors
  Group C works on their menu planning

**July 15**  Food Lab # 7: Cultural cuisine prepared by Group B
  Group C discusses their cultural cuisine menu planning with instructors
  Group A works on their ‘position’ paper

**July 22**  Food Lab # 8: Cultural cuisine prepared by Group C
  “Position paper” due today

**To be announced**: There will be an All JBS Event towards the end of the JBS semester when we may be asked to prepare some finger food and/or do a food demonstration. It was a happily successful event in the summer 2013 HSSP JBS. Not only can we share our culinary expertise with guests, students and faculty of all the JBSs, we will enjoy fielding questions from individuals who would come up to learn from us about what we have been researching, cooking and studying. Let us welcome this event when the announcement comes out.

**ASSIGNMENTS, COURSE GRADING**

The final grade will be determined as follows:

*30% Classroom participation/preparation:*
The success of this class depends on responsible participation by all students for each class, demonstrated by participation and contribution to class discussion and Food Labs. There is no assigned text or written exams. Assigned articles and papers will be handed out in class and posted on LATTE. I embrace scholarly and intellectual engagement and investment in the class and evidence in the material under study.

Attendance is required and recorded per class. Absences will be excused on sound reasons in advance by email. If an unanticipated absence arises, please submit a written email explaining the reason of the absence before the next class.

*35% Student-driven project on the preparation of a diabetic-friendly meal of one of the following racial/ethnic groups in the United States:*
*Africa Americans, Latinos, Asian Americans and Native Americans develop type 2 diabetes at much higher rates than the White population in the United States. Each student group will explore one of the above groups. There will be a total of three student groups.* Team work is encouraged among each group as students research, brain-storm,
plan their diabetic-friendly meal menu as they study a particular cultural diet, lifestyle, social-economic status, health care availability or disparity, language proficiency if applicable, and other factors that might help to explain the higher diabetes rate among this sub-population group. This meal should be representative of the chosen cultural cuisine. Each student group will plan a menu, gather ingredients by going grocery shopping with the Program TA in advance of the Food Lab, cook the meal in the Food Lab and present to the whole class for tasting. Before food sampling, each student in the group that prepares the meal will give a ten minute talk on one or two food dishes of this meal to explain the ingredients used, food preparation techniques and cultural characteristics of the food dishes. Emphasis of their talks should be given to their thoughts and culinary efforts to modify recipes (if necessary) to make the meal suitable for diabetics to enjoy. Students are encouraged to compare the cultural diet they have chosen to study with the gold standard of diets (the Mediterranean Diet) and develop their own ideas regarding applying some principles of the Mediterranean Diet to make their cultural meal more diabetic-friendly. The menus of these meals should be handed in on the day of the respective Food Lab.

35% Student-driven project on a final public presentation and “position paper”:
Again students are encouraged to develop good team-working skills, carry out research, analyze data, do critical thinking, design effective PowerPoint slides and arrive at a PowerPoint presentation (30 minute talk shared by every student in the group, followed by 15 minutes of questions and answers) and a ten-page “position paper”. Both the talk and the paper would introduce the disease diabetes and its rising prevalence, followed by each group’s chosen study of a racial/ethnic group that is more prone to developing diabetes in our country. Then the students would present their research on the particular cultural diet, lifestyle, social-economic status, health care availability or disparity, language proficiency if applicable, and other factors that might explain the higher diabetes rate seen among this sub-population group. This paper would end by stating the “position” of the student group as to how to set up social and health policies or programs to encourage – make it possible for people in their relevant racial/ethnic group to live healthily, eat nutritiously, exercise regularly and help to reduce the rising prevalence of diabetes.

Class discussions will be held throughout the JBS semester regarding public speaking skills. Students are encouraged to practice their group talks among themselves, with the Program TA or in front of their friends in advance of presentation time in order to learn and gain public speaking experience and to time their presentation to fit the allowable time of 30 minutes.

The paper should be presented with 1 inch margin, double-spaced, 11 point Arial font. Standard APA citation is required, but excluded from the ten-page limit. The first two pages of the paper will be devoted to the introduction of diabetes, and the remaining eight pages divided equally for the discussions on the chosen cultural diet and social and health policy. Professor Lai will be responsible for grading the beginning introduction and the cultural diet sections for BISC 10j. Professor Rosenfeld will be responsible for grading the beginning introduction and the social and health policy sections for HSSP 120j.
RESEARCH AND CITATION PROTOCOL
Students need to know how to research library and web resources and apply proper citation protocol. When in doubt, please consult a reference librarian or the instructor or TA.

DISABILITY STATUS
If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see the instructors immediately and bring your documented papers.

ACADEMIC INTEGRITY AND CLASSROOM ETIQUETTE
Please follow university policy. Be respectful to each other, and have fun learning together.

CONCLUSION
It is my intention that the Instructor, TA and the students will have fun learning the topics of nutrition and diabetes rigorously in a scientific way via the proposed combination of lectures, student-driven research, class discussions, teamwork and self exploration, as well as enjoying food preparation followed by feasting on the fruitful labors of our cooking in the Food Lab. It is my hope that some of the students will become inspired to extend this learning not only to how they live their lives but possibly even ultimately to help with health care provision, educating the public about this rapidly rising complex metabolic disease and influencing health policy.