Biology of Obesity and Weight Loss (3 credits)

BIOL 423/BIOL508

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| **Scheduled Meeting Times** | | | | | | |
| **Type** | **Time** | **Days** | **Where** | **Date Range** | **Schedule Type** | **Instructors** |
| Class | 4:30 pm - 6:35 pm | MWTR | ON LINE | June 1st, 2020 - Jul 04, 2020 | Lecture | Anna V Baranova (P) |

**Instructor(s): Ancha Baranova** [**abaranov@gmu.edu**](mailto:abaranov@gmu.edu)**; phone 571-334-1145**

**Textbook:**

Textbook of Obesity (2012) by John Wiley and Sons, LT. Editors: Sharon R.Akabas, Sally Ann Lederman, Barabar J. Moore

**Course Prerequisite(s):**

BIOLOGY 213 completed, or co-enrolled within the same semester, or permission of instructor

**Course Description:**

This course covers causes and consequences of obesity and weight loss. A variety of molecular concepts will be introduced across the class. Supportive materials presented in this class will be in form of bargraphs, correlation curves, immunohistochemically stained slides and molecular signaling maps; the ability to understand these means of scientific data presentation is one of the learning outcome of this class. Another important learning outcome is the development of critical thinking skill that will be evaluated by 4 group-work mini-essays (undergraduates) or individual work (graduate students).

**Course Learning Outcomes:**

* Understand causes and consequences of obesity and weight loss.
* Understand general epidemiology and pathology of co-morbid conditions associated with obesity and how obesity aids in progression of these conditions.
* Understand relative contributions of genetic and environmental factors influencing weight gain and weight loss.
* Understand limitation of the diets and the bariatric surgery
* Understand mechanism of the weight loss caused by anti-obesity medications.
* Understand obesity as systemic pro-inflammatory condition
* Be abreast of the recent trends in obesity research,
* Understand information presented as the bargraphs, correlation curves, immunohistochemically stained slides and molecular signaling maps;
* Improve critical thinking skill

**Course Schedule**

| **Week** | Activity |
| --- | --- |
| **June 1st Monday** | **INTRODUCTORY DISCUSSION. SYLLABUS. TYPES OF EXAMS.** |
| **June 2nd**  **Tuesday** | Nutrigenomics / Nutri-science part 1 |
| **June 3rd, Wednesday** | Nutrigenomics / Nutri-science part 2 |
| **June 4th, Thursday** | Epidemiology of obesity. Obesity as chronic disease associated with an increase in morbidity and mortality. |
| **June 8th Monday** | Co-morbid conditions associated with obesity: non-alcoholic fatty liver disease, polycystic ovary disease, sleep apnea, arthritis, depression and cancer. Part 1 -- AUDIO FILE UPLOADED.  **To play each slide, click on a small grey audio button in a middle of the slide.** Important: IF your audiofiles do not play at all try this:  <http://www.codecguide.com/download_k-lite_codec_pack_standard.htm> |
| **June 9th, Tuesday** | Co-morbid conditions associated with obesity: non-alcoholic fatty liver disease, polycystic ovary disease, sleep apnea, arthritis, depression and cancer. Part 2 -- AUDIO FILE UPLOADED  <http://www.codecguide.com/download_k-lite_codec_pack_standard.htm> |
| **June 10th, Wednesday** | **EXAM 1 (4:30 pm – midnight).** |
| **June 11th, Thursday** | Genetic influences on obesity, including twin and adoption studies, monogenic rodent models of obesity Genetic syndromes that include obesity as part of the phenotype. Leptin deficiency and leptin resistance. Genetic polymorphisms associated with obesity. |
| **June 15th**  **Monday** | The biology of the weight loss and weight gain. Why diets often fail.  Part 1 -- AUDIO FILE UPLOADED. **To play each slide, click on a small grey audio button in a middle of the slide.**  <http://www.codecguide.com/download_k-lite_codec_pack_standard.htm> |
| **June 16th**  **Tuesday** | The bariatric surgery and its consequences. Anti-obesity medications. Anorexia/Cachexia. Part 2 -- AUDIO FILE UPLOADED  <http://www.codecguide.com/download_k-lite_codec_pack_standard.htm> |
| **June 17th  Wednesday** | Obesity as systemic pro-inflammatory condition. pro- and anti-inflammatory molecules produced by adipose. Brown adipose |
| **June 18th**  **Thursday** | **EXAM 2 (4:30 pm – midnight).** |
| **June 22nd, Monday** | Anti-inflammatory melanin biosynthesis: a hypothesis |
| **June 23rd, Tuesday** | Recent trends in obesity research and nutrigenetics. |
| **June 24th, Wednesday** | **LOOK AT THE PICTURE AND INTERPRET IT EXAM**  **(4:30 pm – midnight).** |
| **June 25th,**  **Thursday** | **4 students present** |
| **June 29th, Monday** | **4 students present** |
| **June 30th, Tuesday** | **4 students present** |
| **July 1st, Wednesday** | **Review day** |
| **July 2nd** | **FINAL EXAM - comprehensive** |

**Course Grading** *(UNDERGRADUATE AND GRADUATE)*

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| --- | --- |
| **Component** | **% grade** |
| **Exam 1 (mult choice)** | 15% |
| **Exam 2 (mult choice)** | 15% |
| **“Look-at-the-picture and explain it” exam (short answers)** | 15% |
| **FINAL EXAM (short answers + mult choice)** | 40% |
| **Graduate Presentation QUIZ** | 15% |
| Discussions and Teacher’s points may bring letter grade up-a grade in case if original grade was borderline (i.e. upper-end of range B+ may become A-). If no discussion or Teacher’s point are given, no modification of the borderline score would take place. |  |

100%

**All exam questions covering topics presented in lectures of Dr. Baranova would be identical for grads and undergrads**

**At “look at the picture and explain it” exam**, graduate students will receive 3 extra “molecular”/”cellular” questions. GRADs will be graded upon larger set of question.

Graduate Presentation QUIZ will be given at the same time as final exam. **Graduate Presentation QUIZ will have graduate and undergraduate versions, which will be graded separately.**

Final exam questions will be identical for graduates and undergraduates.

**EACH EXAM will be given at 4:30 pm and collected at MIDNIGHT same day by email (**[**abaranov@gmu.edu**](mailto:abaranov@gmu.edu)**)**

**POLICY FOR EXAMS:**

THERE ARE ABSOLUTELY NO MAKE-UP EXAMS!

**Important:**

**CLASS PROJECTS for GRADUATE STUDENTS ONLY (!)**

Class projects are to be submitted in email form. I will upload them on BB. Presentations are also be uploaded on BB

**INDIVIDUAL CLASS PROJECTS:**

**African Mango (see as example)**

**Barberry/berberin**

**Cinnamon**

**Chili pepper/capsaicin**

**Curcumin**

**Carnitine**

**Bitter orange**

**Green coffee extract**

**Chitosan**

**Garcinia Cambogia**

**Raspberry**

**Hoodia Gordonii**

**Phaseolus vulgaris**

**Caralluma fimbriata**

**PART 1 (PRESENTATION)**

Present clinical and biochemical evidence (or lack thereof) for anti-obesity/ anti-diabetes effects and describe active biochemical components of various **over the counter** **supplements** marketed for weight loss support (list is above).

In each case, find supporting literature describing:

1) plausible biochemical mechanism of action

2) relevant in vitro studies

3) studies in animal models

4) studies in human cohorts

Make general conclusions and make it interesting!

**PART 2 (approx. 3 pages)**

Write a detailed design of experiment to obtain definitive prove/rejection of the claim of “weight loss supportive medication” for biochemical component you reviewed. Justify your choice of design, and any primary or secondary outcomes measured, and any follow-up biochemical/molecular research you plan to perform. Make sure that your study is designed in the way to possibly preclude loss of research money: to do that, make sure you include additional secondary outcomes related to general health rather than BMI. In this case, if your compound will fail in weight loss trial, it will possibly be proven efficient in, say, decreasing insulin resistance (other secondary outcomes are also acceptable)

Treat this part as study grant application.

**Plagiarism:**

Plagiarism is the presentation of someone else’s ideas or work as one’s own. Students must give credit for any information that is not either the result of original research or common knowledge. If a student borrows ideas or information from another author, he/she must acknowledge the author in the body of the text and on the reference page. Students found plagiarizing are subject to the penalties outlined in the Policies and Procedures section of the University Catalog, which will result in a hearing by the Honor Code Committee and may include a failing grade for the work in question or for the entire course. The following website provides helpful information concerning plagiarism for both students and faculty: <http://oai.gmu.edu/honor-code/>

**Honor Code:**

* George Mason University has an Honor Code, which requires all members of this community to maintain the highest standards of academic honesty and integrity. Cheating, plagiarism, lying, and stealing are all prohibited
* All violations of the Honor Code will be reported to the Honor Committee.
* See <http://oai.gmu.edu/honor-code/> for more detailed information.

**Ethics:**  
Ethical behavior in the classroom is required of every student. The course will identify ethical policies and practices relevant to course topics.

**Diversity:**

Learning to work with and value diversity is essential in every class. Students are expected to exhibit an appreciation for multinational and gender diversity in the classroom.

**Civility:**

As a diverse community of learners, students must strive to work together in a setting of civility, tolerance, and respect for each other and for the instructor. Rules of classroom behavior (which apply to online as well as onsite courses) include but are not limited to the following:

* Conflicting opinions among members of a class are to be respected and responded to in a professional manner.
* Side conversations or other distracting behaviors including cell phone use or non-class online access are not to be engaged in during lectures, class discussions or presentations
* There are to be no offensive comments, language or gestures

Students not complying will be asked to cease immediately or leave the class session. **Students with Disabilities:**

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703.993.2474.  All academic accommodations must be arranged through that office.