Analytical Biotechnology (BIOL 5501), Fall 2017

Syllabus

Lecture Instructor:
Alla Arzumanyan, Ph.D.
Room 446B, BioLife Sciences Bldg.
Phone: 215-204-8359
E-mail: areg@temple.edu
Office hours: by appointment

Lectures will be held on Tuesdays and Thursday, 5:30 AM - 6:50 PM, Biology-Life Sciences Building, R 234.

Course Description: Formerly, BIOL5501 and BIOL5521 courses were two parts of a single course Analytical biotechnology which introduced modern approaches to the analysis of biomolecules. Currently, these are two separate courses, with a special focus on proteins (BIOL5501) and nucleic acids (BIOL5521). This course covers basics of the ribosomal and non-ribosomal biosynthesis of the proteins and peptides, their structure, organization and properties, post-translational modifications (special emphasis on epigenetics and inteins), key functions (including medical, diagnostic and industrial uses of proteins, e. g., enzymes, monoclonal antibodies, and vaccines), and major classes of peptides (hormones, antibiotics, toxins, and neuropeptides). Lectures will also include topics on protein detection, purification and characterization, such as 2D and capillary electrophoresis, chromatography (size exclusion, ion-exchange, affinity, reversed-phase HPLC). Students will learn how to improve experimental conditions for the “optimum resolution in the minimum time” (HPLC Method Development) and fundamentals in mass spectrometry (MALDI-TOF, ESI), and Nuclear Magnetic Resonance spectroscopy (NMR). Last lecture discusses chemical synthesis of the peptides (Solid Phase Peptide Synthesis).

This course requires some background in molecular biology and biochemistry. There is no a formal textbook. Lectures are composed using variety Internet sources, books and manuscripts.

Blackboard (Bb)/Class Communication: Check Bb and e-mail frequently. Course announcements, lecture slides with relevant handouts and references, assignments, and all grades will be posted on Bb. E-mail communications must be conducted using Temple e-mail account (please do not forget to include your full name in the e-mail).

You are always welcome to ask questions about course material, to talk about your performance, study habits or ask advice on how to become a better exam taker. Please do not wait until the end of the course to express your concerns. I will make every effort to help you learn the course material, but you must also study well to acquire both understanding and professional skills, at a high academic standard, that will be important for the class and your future success.

Disability Disclosure: Students who need accommodation due to disability should contact the Office of Disability Resources and Services (DRS) and notify me in advance to make appropriate arrangements (e. g., extended time for the exams). DRS contact information: http://disabilityresources.temple.edu/contact
**Student and Faculty Academic Rights and Responsibilities Policy** can be accessed through the link [http://policies.temple.edu/getdoc.asp?policy_no=03.70.02](http://policies.temple.edu/getdoc.asp?policy_no=03.70.02)

**Grading:** Grades will be based on the following criteria:

1. **Homework (HW) assignments** will consist of essay, problem-solving questions and relevant literature search to support your answers. Each HW has assigned due date and time and should be submitted through Bb.

2. **Exams** will consist of short answer questions. The last exam is not comprehensive. Students are expected to take exams on the designated day and time. Make-up exams will be allowed in case of illness or personal issues (supporting documentation is required).

**Point breakdown** (*maybe subject to change*):

<table>
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<tr>
<th>Two exams, 100 pts./exam</th>
<th>200 pts.</th>
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<tr>
<td>Four HW assignments</td>
<td>100 pts.</td>
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**Total:** 300 pts.

Final grades will be awarded based upon the achievement and assigned on a straight scale:

100 - 90% pts.: (A and A-)
89 - 78% pts.: (B+, B and B-)
77 - 67% pts.: (C+, C and C-)

**Lecture Schedule** (*may be subject to change*)

1 (09/29) and 2 (09/31): Protein biosynthesis, structure & properties.

3 (10/05): Protein post-translational modifications, applications in biotechnology.

4 (10/07), 5 (10/12) and 6 (10/14): Protein & peptide functions, applications in biotechnology.

**Exam 1 (Lectures 1-6), 10/19 (Tuesday)**

7 (10/21) and 8 (10/26): Principles of Electrophoresis and Chromatography.

9 (10/28): HPLC Method Development.

10 (11/03): Mass Spectrometry. NMR.


**Study day, 11/10 (Tuesday)**

**Exam 2 (Lectures 7-11), 11/12 (Thursday)**