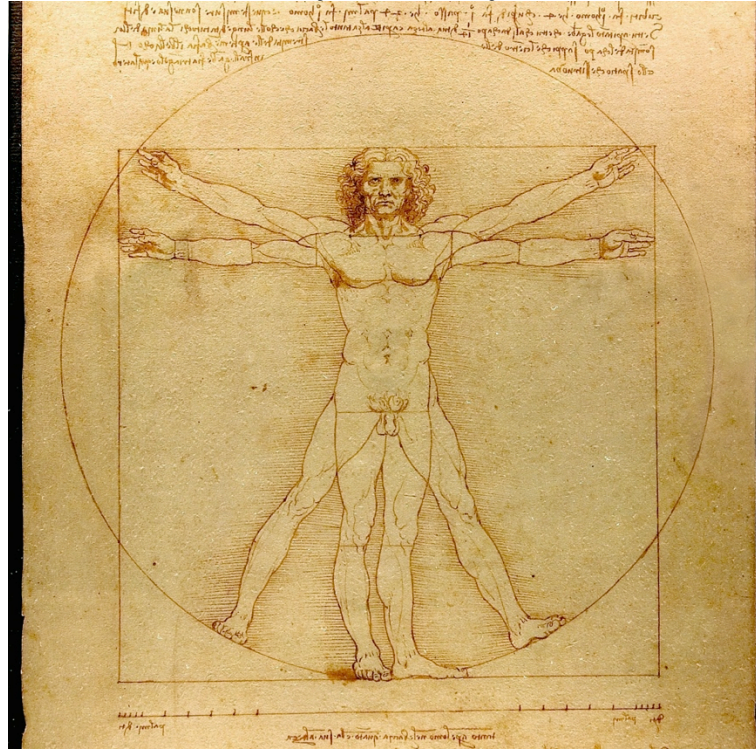


Biology of Cancer.

BIOL 492O/692 (3) CRN 80179, 80180

Preliminary Course Syllabus



Leonardo da Vinci. *The Vitruvian Man* (drawing circa 1490)
Gallerie dell'Accademia, in Venice, Italy.

Andrej Podlutsky

**University of Alaska Fairbanks
Fall Semester 2014**

Classes: Tuesday & Thursday, Murie Room 107

Course covers current knowledge of cancer: basic research, treatment, various genetic and molecular changes normal cells undergo during transformation into malignant cells. Topics include: growth factors, oncogenes, tumor suppressors, cancer-causing viruses, and current therapeutic approaches to treatment. Premed-students would benefit by learning about fastest developing field of medicine.

Version: 10/03/2014

This syllabus is **subject to change**

Course syllabus*, content and format are modified from earlier offerings of Biology 492/692.

* also from: Dr. Michael Harris syllabus for
the "Neurobiology" course, BIOL4170/617

1. Course Information:

Course Information:

Biology of Cancer, BIOL 492O/692 (3); CRN 80179, 80180

Meeting times: Tuesday & Thursday 11:30 am – 1:00 pm, Murie room 107

Prerequisite: BIOL360 (with BIOL115X & 116X); or permission of instructor.

Instructor:

Andrej Podlutsky, Ph.D., Associate Professor of Molecular Biology

Office:	AHRB room 2W04
Research Lab:	AHRB 2W10
Phone:	474-6759 (office)
E-mail:	apodlutsky@alaska.edu
Mailbox:	Irving I Room 311
Lectures:	Tu & Th 11:30 am -1:00 pm
Lecture room:	Murie, room 107
Office hours:	Wednesday 10:00 am – 12:00 pm, or by appointment

2. Course readings/materials

Textbook: “The Biology of Cancer” 2nd Edition, 2013, By Robert A. Weinberg, Garland Publishing; and other readings as assigned

Blackboard Page:

Students are expected to check the course webpage on **Blackboard** on a regular basis.

Login at <http://classes.uaf.edu>

Select “Introduction to Biology of Cancer”

Online Quizzes:

A series of quizzes will be given via the “online quizzes” tab of BlackBoard

It is assumed that all students will have access to the internet. Contact me by email **immediately** if you are unable to access either the class blackboard or the publisher’s textbook site.

Email Notifications:

On occasion, students will be contacted via email. I will assume that each student will check their university-assigned email address (username@alaska.edu) on a regular basis. If you use another address, it is up to you to have your official university assigned address forward appropriately.

3. Course description:

Welcome to the Biology of Cancer! The UAF Catalogue describes the topic of this course as follows:

Course covers current knowledge of cancer: basic research, treatment, various genetic and molecular changes normal cells undergo during transformation into malignant cells. Topics include: growth factors, oncogenes, tumor suppressors, cancer-causing viruses, and current therapeutic approaches to treatment. Premed-students would benefit by learning about fastest developing field of medicine.

The goal of this course is to cover current concepts and knowledge of cancer, including cancer research and cancer treatment; it will educate students on various genetic and molecular changes normal cells undergo during transformation into malignant cancer cells. This course will explore the cellular and molecular mechanisms underlying cancer development with the aim of understanding how changes in the normal growth and division processes lead to the formation of tumors. Topics include the natural history of cancer, oncogenes, tumor suppressors, cancer-causing viruses, and current therapeutic approaches to cancer treatment. It will cover the **fundamental facts and principles of cancer biology**.

Students will gain knowledge of tumorigenesis, learn techniques commonly used in cancer biology, sharpen their critical thinking skills, and gain insight into the cellular and molecular basis of disease. Students will be able to: describe the six hallmarks of cancer, explain the types of gene mutations possible and how these mutations can contribute to cancer formation, describe an oncogene and why it is important in cancer development, describe the function of tumor suppressor genes, learn how cancer cells escape cell death, and explain current approaches in cancer treatment.

Course Organization: The course will consist of 6 major themes, each divided into topics. We will spend 2 - 4 class periods on each topic. You will receive more detailed outlines for upcoming lectures on each topic (posted on the web site). Questions and discussion throughout the course are encouraged and this syllabus should be considered flexible. For example, if there is great interest and prolonged discussion regarding growth factors and receptors, we will spend more time on this subject and can easily adjust the rest of the course to accommodate. If necessary, exams may be rescheduled.

The basic goals of this course are:

1. To understand key concepts of cancer biology, such as:

- a) Molecular mechanisms behind of seven distinctive characteristics of cancerous cell;
- b) Role of oncogenes and tumor suppressor genes in tumor formation and invasiveness;
- c) The integration of basic scientific knowledge into medical research and treatment protocols.

2. To contribute to a student-centered interactive learning environment. A substantial proportion of the content of the course will be presented and chosen by students.

3. To improve oral communication skills. This is an oral intensive class and you will get detailed feedback from peers and the instructor for all your presentations.

4. To work effectively with others. This includes teamwork to prepare for lectures and presentations, participation in group discussion and peer evaluation.

We will use a variety of approaches to achieve these goals:

- 1. Lecture and discussion.** In lecture, we are going to talk about the basic concepts in Biology of Cancer. An important source for this information is from written material including, but not limited to, Robert A. Weinberg, The Biology of Cancer, 2nd Edition, 2013, By Garland Publishing. Quizzes will test your knowledge of the lecture material, and material in the text not covered in lecture. So you need access to the text material.
- 2. Student-led lectures (BIOL 492 and 692).** Presentation of lecture material by students is one of the best learning tools for the presenters as well as the listeners. BIOL 492 students will give **two 15-minute lecture** presentations. BIOL692 students will give **one 45-minute lecture** presentation.

1st presentation: Based on topic selected from the text. A group of 3 students will select material assigned for a particular class. Students will divide the material, and each will present a portion of that material as an **individual presentation**. Group presentations **are not acceptable**.

2nd presentation: each student will select and present a 2nd topic and make a 2nd **individual presentation**. The subject matter for this presentation may be either;

- a) a recent, i.e., 2008 or later, peer-reviewed article on a biology of cancer topic that appeared in primary scientific literature sources, e.g., journals such as Science, Nature, or Journal of Cancer Biology and Research.
- b) a review on a topic in biology of cancer of your choice.
- c) A topic from the text not already covered.

- 3. A written review on a topic in the biology of cancer of your choice (BIOL692).** This is an individual project on a topic of your choice.

4. Course Requirements

You are expected to read the assigned textbook chapters, to attend the lectures, and take part in class exercises. The textbook and the lectures together define the **material covered in the quizzes and exams**. Practice questions as well as summaries of the facts and principles emphasized in class will be posted on **Blackboard**. Additional announcements will be made in class, via e-mail, and on Blackboard.

Attendance and Class Participation

Class attendance is required. If for any reason you are not able to attend a specific class meeting, you will be responsible for catching up with the material covered during the absence. I will make a **subjective** assessment of each student's class participation, and assign a grade during final evaluation (5% of total). If you are required to participate in either (a) military or (b) UAF-required activities that will cause you to miss class, you must notify me as soon as possible before your absence. Tardiness, absenteeism, inattentiveness, and unfamiliarity with course material will all negatively impact this subjective assessment. Note that UAF policy provides a mechanism for an instructor to unilaterally withdraw a student from any course. Chronic absenteeism will be grounds for such action, at the discretion of the instructor.

Quizzes

There will be 15 chapter quizzes. These will be short, "open book" readiness assessments, administered via the BlackBoard website. Quizzes will be assigned for Chapters 2 through 16, and must be completed on-line **prior to** the class where this material is discussed. Each quiz will count toward 1.5% of the final grade (the lowest mark of the 21 will be ignored, for a total of 30% of total).

Midterm and Final Exams

There will be a Midterm Exam (date to be determined), and a Final Exam (Exam 11:30 - 1:00 p.m., Tuesday, December 17, counting toward 15 and 25% of the total grade, respectively).

Oral Presentations: General Information

Biol 492 carries an "Oral Intensive" designation, requiring that a significant component of evaluation is derived from oral communication. You will receive information and be instructed on effective speaking, on organization of material for effective presentation, and on development and use of media and visual aids.

You will be evaluated on the following six criteria:

- Effectiveness of description of the objectives of your presentation and how it fits in with previously presented material if applicable
- Effectiveness of description of the main points of the lecture material or primary literature research study
- Comprehension of the topic
- Original conclusions, synthesis, or recommendations for further research
- Effectiveness of presentation
- Ability to stimulate discussion

Oral Presentation: 15 minute presentation (BIOL492)

Each student will give one 15-minute presentation on the topic materials assigned for a particular class day (**themes II through VI**). Three students will present in a given period. Lectures will each be followed by up to 5 minutes of general discussion. Students will also be asked to coordinate your presentations with the other students who present on the same day. Please be advised that the assigned readings contain much more information than can be presented during one class meeting. Therefore, you will have to carefully evaluate and coordinate with the other student what material to present. **The first presentation will count for 10% of total course grade.**

This course is truly student driven, as students can decide and present the content. However, regardless of what is presented in each lecture, all text material is fair game for the exams. Students may volunteer for a particular topic, or lecture dates will be assigned during the 2nd or 3rd week of class.

In addition to the above 15-minute presentation, students will make one other 15-minute presentation which can be one of the following;

- 1) A second 15-minute lecture, the topic materials selected from themes II through V, or optional topics in Theme VI.**
- 2) A 15-minute individual presentation on the theme of “Biology of Cancer: what does it mean to us?”**
- 3) A 15-minute presentation describing a research report from the current Biology of Cancer literature.**

The second presentations are also expected to be 15 minutes followed by 5 minutes for questions and comments. Four presentations will be made in the class period. **The second presentation will count for 15% of total course grade.**

Oral presentation: Biology of Cancer: what does it mean to us?

Students who chose this option will present a review of current knowledge on a topic in Biology of Cancer of your choice, incorporating one or more articles from the peer-reviewed primary literature or, at the discretion of the instructor, some other comprehensive work. Students are asked to choose a topic that has relevance to “us” (humans, students, aging professors, Alaskans, etc). Different students not allowed to present on the same topic. Topics are selected on a first-come-first-served basis, so think about this early.

Some things to keep in mind while you are preparing for this review presentation:

- Since the topic should have direct relevance to biology of cancer, many topics in medicine and patients care may not apply.
- A great review will have a balanced approach; although the presentation of current knowledge is important, leave time to discuss issues such as controversies in the field, problems in interpretation of results, and/or suggestions for future research.
- How you present your review depends on the topic. For example, discussing the genetic and hereditary basis of a malignant disorder may require a different approach from discussing the effects of a pollutant or life-style on risk of certain type of cancers.
- The instructor will evaluate the overall performance according to criteria discussed in the General Information about Oral Presentations section above.

- Some suggestions for review topics:
 - ★ Basic cancer research and clinical trials
 - ★ War on cancer: who is winning?
 - ★ Ecological and environmental risk-factors in cancer
 - ★ Spontaneous remission of cancer
 - ★ Immunotherapy: current approach
 - ★ Combinational therapy in cancer treatments

Oral Presentation: Literature Review

Students also have the option of an oral presentation on an article from the peer-reviewed primary literature. These articles will complement lecture topics and should be taken from the recent literature (published in 2008 or more recently). You are strongly encouraged to select the article at least three weeks before your presentation, and provide a copy for distribution to the class.

Each presentation should be 15 minutes long and will be followed by a 5-minute question and answer period. We may have three different presentations during a class period.

Some things to keep in mind while you are preparing for this presentation:

- Does the quality of the study warrant publication?
- Do the authors give an appropriate rationale for their study?
- Are the methods and research designs appropriate?
- Are the (statistical) analyses of the data done appropriately?
- Is the presentation of the results done clearly and in the best way possible?
- Are the sample sizes appropriate?
- Do the results warrant the authors' conclusions?
- What other interpretations of the results are possible?
- What follow-up studies could/should be done?
- Does the study represent a major advance in the field?

Oral Presentation: Full-Length Lecture (BIOL692 only)

Students taking BIOL792 are required to;

- 1) Give a 45 minute lecture on the topic materials assigned for a particular class day (themes II through VI).

Written Literature Review (BIOL692 only)

Students taking BIOL692 are required to write a review article on a topic in Biology of Cancer. The topic should be different from that chosen for your oral presentation. The topic can be related to Thesis or Dissertation research. The review paper should be based on at least 5 peer-reviewed journal articles. Your paper should be 8-10 pages long, printed, double spaced. I will not accept hand written documents. The 8-10 page limit is only a guideline. It refers to the body of the text and not to the Literature Cited/Reference list or to any tables or figures. I will not be counting pages. I give you this guideline so you will know approximately how large of an effort I expect.

You may submit the literature review via email, as a virus-free text file readable by Microsoft Word **for windows** (ie .doc, .docx or .pdf). A preliminary draft of the review can be submitted no later than November 19, 2015, and will be returned within one week with comments and suggestions. **The final draft is due at noon, December 17, 2015.** The assignment is worth 15% of the final grade, 2% of which will be deducted per day for late submission.

5. Grading

The final grade will be based on the average of all assignment marks according to the following fixed scale:

		BIOL492O	BIOL692
1.	Attendance and Class Participation	5%	5%
2.	Midterm / Quizzes	45% (15% Midterm, 30% Quizzes)	45% (15% Midterm, 30% Quizzes)
3.	1 st Oral presentations 30 minute Lecture	10% (5% peer evaluation & 5% instructor evaluation)	-
4.	2 nd Oral Presentation:	15% (7.5% peer evaluation & 7.5% instructor evaluation)	-
5.	Oral Presentation: 45 minute Lecture	-	15% (5% peer evaluation & 10% instructor evaluation)
6.	Written Literature Review	-	10% (instructor evaluation)
7.	Final	25%	25%
Total		100%	100%

The class will be graded on a straight percentage basis: 90-100% is an A, 80-89.9% is a B, 70-79.9% is a C, 60-69.9% is a D, and < 60% is an F. This class will **not** use the University's plus/minus grading scale. **I will not grade on a curve.** Supplemental assignments **may** be provided at the discretion of the instructor.

Missed assignments:

Times for oral presentations will be assigned well in advance. Presentation of assigned material at the assigned time will be the responsibility of the student. Missed oral presentations will **NOT be rescheduled. Accommodations will only be made for legitimate and documented emergencies.**

Disabilities Services:

At UAF, the Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (208 Whitaker Building, 474-5665) to provide reasonable accommodation to students with disabilities. Office of Disability Services: uaf-disabilityservices@alaska.edu, phone (907)474-5655, or TTY (907)474-1827.

6. Dates and topics (Subject to change)

Theme I. Fundamentals of Cancer Biology.

Topic #		Weinberg R.A.
1	Introduction/Biology and Genetics of Cells and Organisms	Chapt. 1
2	Nature of Cancer	Chapt. 2
3	Tumor Viruses	Chapt. 3

Theme II. Oncogenes and signaling programs.

4	Cellular Oncogenes	Chapt. 4
5	Growth Factors, Receptors and Cancer	Chapt. 5
6	Cytoplasmic Signaling Circuitry Programs	Chapt. 6

Theme III. Master Guardians and Executioners.

7	Tumor Suppressor Genes	Chapt.7
8	pRb and Control of Cell Cycle	Chapt. 8
9	p53 and Apoptosis	Chapt. 9
	<i>Midterm Exam, Chapters 1-9</i>	

Theme IV. Eternal Life and Genetic Integrity.

10	Cell immortalization	Chapt. 10
11	Multi-Step Tumorigenesis	Chapt. 11
12	Maintenance of Genetic Integrity	Chapt. 12

Theme V. Invasion and Colonization.

13	Biology of Angiogenesis	Chapt. 13
14	Invasion Metastasis	Chapt. 14

Theme VI. Rational Treatment of Cancer.

15	Tumor Immunology and Immunotherapy	Chapt. 15
16	Strategy of Treatment	Chapt. 16
17	Aging and Cancer Risk	TBA

	<i>Final Exam</i> Ch 2-16, additional topics, plus... student presentations
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This table will be used to plan and track course content. This schedule will be dictated by the number of students enrolled in the class and is subject to modification.
 Chapters refer to Weinberg R.A., Biology of Cancer 2th ed.

Date	Lecture	Exam	Book Chapter
9/8	Introduction: Biology and Genetics of Cells and Organisms		Ch 1
9/10	The Nature of Cancer		Ch 2
9/15	Tumor Viruses		Ch 3
9/17	Cellular Oncogenes		Ch 4
9/22	Growth Factors, Receptors, and Cancer		Ch 5
9/24	Cytoplasmic Signaling Circuitry Programs		Ch 6
9/29	<i>Current Topics in Cancer Research. Student's presentation</i>		
10/1	Tumor Suppressor Genes		Ch 7
10/6	pRb and Control of the Cell Cycle Clock		Ch 8
10/8	p53 and Apoptosis: Master Guardian and Executioner		Ch 9
10/13	<i>Current Topics in Cancer Research. Student's presentation</i>		
10/15		Midterm Exam	
10/20	Eternal Life: Cell Immortalization and Tumorigenesis		Ch 10
10/22	Multi-Step Tumorigenesis		Ch 11
10/27	Maintenance of Genomic Integrity and the Development of Cancer I		Ch 12
11/3	Maintenance of Genomic Integrity and the Development of Cancer II		Ch 12
11/5	<i>Current Topics in Cancer Research. Student's presentation</i>		
11/10	<i>Current Topics in Cancer Research. Student's presentation</i>		
11/12	Heterotopic Interactions and the Biology of Angiogenesis		Ch 13
11/17	Moving Out: Invasion and Metastasis		Ch 14

11/19	Stem Cells and Cancer <i>Current Topics in Cancer Research.</i> <i>Student's presentation</i>		TBA
11/25	Crowd Control: Tumor Immunology & Immunotherapy I		Ch 15
11/27	Crowd Control: Tumor Immunology & Immunotherapy II		Ch 15
11/24	Rational Treatment of Cancer		Ch 16
12/1	Rational Treatment of Cancer <i>Current Topics in Cancer Research.</i> <i>Student's presentation</i>		Ch 16
12/3	Aging as a Major Risk Factor of Cancer <i>Current Topics in Cancer Research.</i> <i>Student's presentation</i>		TBA
12/8	Makeup class and/review session(s)		
12/10	Makeup class and/review session(s)		
12/??		Final Exam	

Final Exam: ***to be determined***

7. Student Code of Conduct

As a UAF student, you're subject to the Student Code of Conduct. In accordance with Board of Regents' Policy 09.02.01, UAF will maintain an academic environment in which the freedom to teach, conduct research, learn, and administer the university is protected. Students will enjoy maximum benefit from this environment by accepting responsibilities commensurate with their role in the academic community. The principles of the Code are designed to facilitate communication, foster academic integrity, and defend freedoms of inquiry, discussion, and expression among members of the university community. You should become familiar with campus policies and regulations as published in the student handbook.

UAF requires students to conduct themselves honestly and responsibly, and to respect the rights of others. Conduct that unreasonably interferes with the learning environment or that violates the rights of others is prohibited. Students and student organizations will be responsible for ensuring that they and their guests comply with the Code while on property owned or controlled by the university or at activities authorized by the university.

Disciplinary action may be initiated by the university and disciplinary sanctions imposed against any student or student organization found responsible for committing, attempting to commit, or intentionally assisting in the commission of any of the following prohibited forms of conduct:

- A. cheating, plagiarism, or other forms of academic dishonesty;
- B. forgery, falsification, alteration, or misuse of documents, funds, or property;
- C. damage or destruction of property;
- D. theft of property or services;
- E. harassment;
- F. endangerment, assault, or infliction of physical harm;
- G. disruptive or obstructive actions;
- H. misuse of firearms, explosives, weapons, dangerous devices, or dangerous chemicals;
- I. failure to comply with university directives;
- J. misuse of alcohol or other intoxicants or drugs;
- K. violation of published university policies, regulations, rules, or procedures; or
- L. any other actions that result in unreasonable interference with the learning environment or the rights of others.

This list is not intended to define prohibited conduct in exhaustive terms, but rather to set forth examples to serve as guidelines for acceptable and unacceptable behavior.

Honesty is a primary responsibility of you and every other UAF student. The following are common guidelines regarding academic integrity:

1. Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.
2. Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses and other reports.
3. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.

Alleged violations of the Code of Conduct will be reviewed in accordance with procedures specified in regent's policy, university regulations and UAF rules and procedures. For additional information and details about the Student Code of Conduct, contact the Dean of Student Services

or web www.alaska.edu/bor/ or refer to the student handbook that is printed in the back of the class schedule for each semester. Students are encouraged to review the entire code.

A Few Words on Plagiarism

In general, DO NOT present someone else's ideas or data as your own: you are expected and required to give credit where credit is due.

Plagiarism is a violation of the law and may lead to serious repercussions! Please follow the following guidelines: for any written assignments, if you use someone else's ideas, data, or other information, write it in your own words and include the reference in parentheses directly following that information. Avoid copying someone else's text. If, however, you feel you have to include an exact copy of that text, put it in quotation marks followed by the reference in parentheses. Of course, include all cited references in the Literature Cited section. During oral presentations, please acknowledge the sources by mentioning their name(s) and year of publication or by printing them on overheads, slides, or handouts. Also be aware that you need to cite earlier work by yourself. Any substantial use of any written or other materials that was used for another course or that was generated in any other circumstances will not be accepted for credit in this course. Only minor contributions from earlier work with appropriate citation(s) will be accepted.

Email Etiquette: I will do my best to respond to your email inquiries within 24 hrs. Please be considerate in your letters and use proper English grammar. Think before you send and never write anything you would feel uncomfortable saying to me (or anyone else!) in person. Please sign your letter; addresses don't always reveal the identity of the writer.

!!! Acknowledgement:

This syllabus (ideas, format, wording and content) was designed with the help of Dr. Michael Harris of UAF, who teaches "Neurobiology" class (BIOL470/617), his contribution is greatly appreciated and acknowledged.

Dr. Harris contribution was crucial in the syllabus development, however, any errors/mistakes are sole responsibility of Andrej Podlutsky.