George Mason University
Graduate Course Approval/Inventory Form

Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate: ____X___ NEW  ____ MODIFY  ____ DELETE

Local Unit: Molecular and Microbiology

Graduate Council Approval Date:

Course Abbreviation: BIOL  Course Number: 566

Full Course Title: Cancer Genomics

Abbreviated Course Title (24 characters max.): Cancer Genomics

Credit hours: 3  Program of Record: MS/Biology, PhD/Bioscience

Repeatable for Credit?  ___ D=Yes, not within same term  ___ T=Yes, within the same term  ___ X_ N=Cannot be repeated for credit

Activity Code (please indicate):  _X__ Lecture (LEC)  ___ Lab (LAB)  ___ Recitation (RCT)
 ___ Studio (STU)  ___ Internship (INT)  ___ Independent Study (IND)  ____ Seminar (SEM)

Catalog Credit Format  3 : 3 : 0

Course Level: GF(500-600) ___X__ GA(700+)

Maximum Enrollment: 20  For NEW courses, first term to be offered: Spring 07

Prerequisites: A course in genetics or biochemistry.

Catalog Description (35 words or less)  Please use catalog format and attach a copy of the syllabus for new courses.:

Review of modern concepts in cancer biology including taxonomy of human tumors, common cancer syndromes, and genome instability. Genetic and molecular studies of tumor cell proliferation, migration, invasion, and death.

For MODIFIED or DELETED courses as appropriate:  NA

Last term offered:  Previous Course Abbreviation:  Previous number:

Description of modification:

APPROVAL SIGNATURES:

Submitted by:  _______________  date: ___________________  email: __proyt@gmu.edu____________

Department/Program:  _______________  Date: ___________________

College Committee:  _______________  Date: ___________________

Graduate Council Representative:  ___________________________  Date: ___________________
GEORGE MASON UNIVERSITY
Course Coordination Form

Approval from other units: NA

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

<table>
<thead>
<tr>
<th>Unit:</th>
<th>Head of Unit’s Signature:</th>
<th>Date:</th>
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Graduate Council approval: ___________________________________________ Date: ____________
Graduate Council representative: ___________________________ Date: __________
Provost Office representative: ___________________________ Date: __________
Proposed New Course: BIOL 566: Cancer Genomics (3 credits)

Syllabus

Instructor: Dr. Ancha Baranova
Email: abaranov@gmu.edu
Phone: 703-993-4293 office
Web Page: www.gmu.edu/departments/mmb/baranova

Course objectives:

This course in cancer genomics will review the modern concepts in cancer biology. We will discuss histological and molecular taxonomy of human tumors, and common syndromes associated with increased probability of tumor development. We will highlight genomic instability as a central player that is important for cancer initiation, progression and response to chemotherapeutic agents. We will go through both position-dependent and position-independent strategies allowing one to discover genes involved in human tumor development. We will also focus on high-throughput methods of cancer research, including various methods of expression profiling. A systematic review of molecular pathways involved in cancer development will be presented in the course. This will involve a detailed study of molecular consequences of oncogene activation and tumor suppressor gene inactivation. We will untangle the molecular network underlying cell death and cell proliferation in cancer, as well as tumor cell invasion, migration and induction of angiogenesis. Also we will review examples of therapeutic agents that specifically "target" tumor cells in order to prevent, diagnose, treat, and provide follow-up surveillance of cancer.

Recent research papers from the peer-reviewed scientific journals will be available for home reading and discussion in the class. Each participant of the class will be required to prepare an overview of one or two papers (depending on paper size and content) for general discussion. It is the responsibility of the student to be prepared to discuss these papers as to the methodology used, the results of the experiments and the conclusions drawn from the results.


<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1</td>
<td>HUMAN TUMORS -- epidemiology, classification, conventional treatment.</td>
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<tr>
<td>3</td>
<td>Tumor suppressor genes and oncogenes. Cancer syndromes and other types of cancer predisposition.</td>
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<td>4</td>
<td>Instability of genome as a fundamental feature of cancer cell. Types of mutations, LOH and LOI. Cancer-associated polymorphisms.</td>
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<td>5</td>
<td>A review of the cancer gene cloning strategies in pre-genomic and post-genomic eras.</td>
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<td>6</td>
<td>Signaling pathways damaged or short-circuited in human tumors: RB genes network, cyclines, CDKs, CDKIs.</td>
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<tr>
<td>7</td>
<td>Signaling pathways damaged or short-circuited in human tumors: Receptors and RTKs, SMADs, RAS-cascade, PTEN, NF1 etc. EXAM I.</td>
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<tr>
<td>8</td>
<td>Extracellular matrix signaling, hypoxia, angiogenesis-related pathways and VHL.</td>
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<td>9</td>
<td>Differentiation-related pathways in leukemias and lymphomas.</td>
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<td>10</td>
<td>P53 as guardian of genome; BRCA1 and BRCA2 genes.</td>
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<tr>
<td>11</td>
<td>Genome instability diseases as precondition for cancer. HNPCC, AT, XP, Bloom, Fanconi, Werner syndromes and underlying genes.</td>
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Grading:

<table>
<thead>
<tr>
<th>Grading</th>
<th>Percentage</th>
<th>Points</th>
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<tbody>
<tr>
<td>Midterm exam</td>
<td>35%</td>
<td>100pts</td>
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<tr>
<td>Final exam</td>
<td>35%</td>
<td>100pts</td>
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<tr>
<td>Paper presentations</td>
<td>25%</td>
<td></td>
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<tr>
<td>In Class discussion</td>
<td>5%</td>
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All exams will be written form.

Letter grades for the course will be assigned as follows:

<table>
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<tr>
<th>Grade</th>
<th>Overall %</th>
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<tbody>
<tr>
<td>A</td>
<td>&gt;90</td>
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<tr>
<td>A-</td>
<td>85-89.9</td>
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<tr>
<td>B+</td>
<td>80-84.9</td>
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<tr>
<td>B</td>
<td>70-79.9</td>
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<tr>
<td>C</td>
<td>60-69.9</td>
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<tr>
<td>F</td>
<td>&lt;69.9</td>
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The final exam will be given according to the university schedule.

Examples of papers for student presentations (year 2003).


Duesberg P, Stindl R, Hehlmann R. Explaining the high mutation rates of cancer cells to drug and multidrug resistance by chromosome reassortments that are catalyzed by aneuploidy. Proc Natl Acad Sci U S A 2000 Dec 19;97(26):14295-300

Shipp MA, Ross KN, Tamayo P, Weng AP, Kutok JL, Aguiar RC, Gaasenbeek M,
Angelo M, Reich M, Pinkus GS, Ray TS, Koval MA, Last KW, Norton A, Lister TA,
Mestrov J, Neuberg DS, Lander ES, Aster JC, Golub TR. Diffuse large B-cell lymphoma outcome prediction by gene-expression

L. High-throughput retroviral tagging to identify components of specific signaling

HC, Malley JD, Naiman DQ, Jenkins NA, Copeland NG.

Topley GI, Okuyama R, Gonzales JG, Conti C, Dotto GP. p21(WAF1/Cip1) functions as a suppressor of malignant skin tumor

Gorelik L, Flavell RA. Immune-mediated eradication of tumors through the blockade of transforming growth factor-beta signaling in

Cancer  2002 Jul;2(7):521-8

Sebti SM, Hamilton AD. Farnesyltransferase and geranylgeranyltransferase I inhibitors and cancer therapy: lessons from mechanism
and bench-to-bedside translational studies. Oncogene  2000 Dec 27;19(56):6584-93

Jan;24(1):57-60


Cancer Res  2000 Sep 15;60(18):5002-6

p53 is essential for chemotherapy-induced hair loss.
Botchkarev VA, Komarova EA, Siebenhaar F, Botchkareva NV, Komarov PG, Maurer M, Gilchrest BA, Gudkov AV.

Bergsmedh A, Szeles A, Henriksson M, Bratt A, Folkman MJ, Spetz AL, Holmgren L. Horizontal transfer of oncogenes by uptake of